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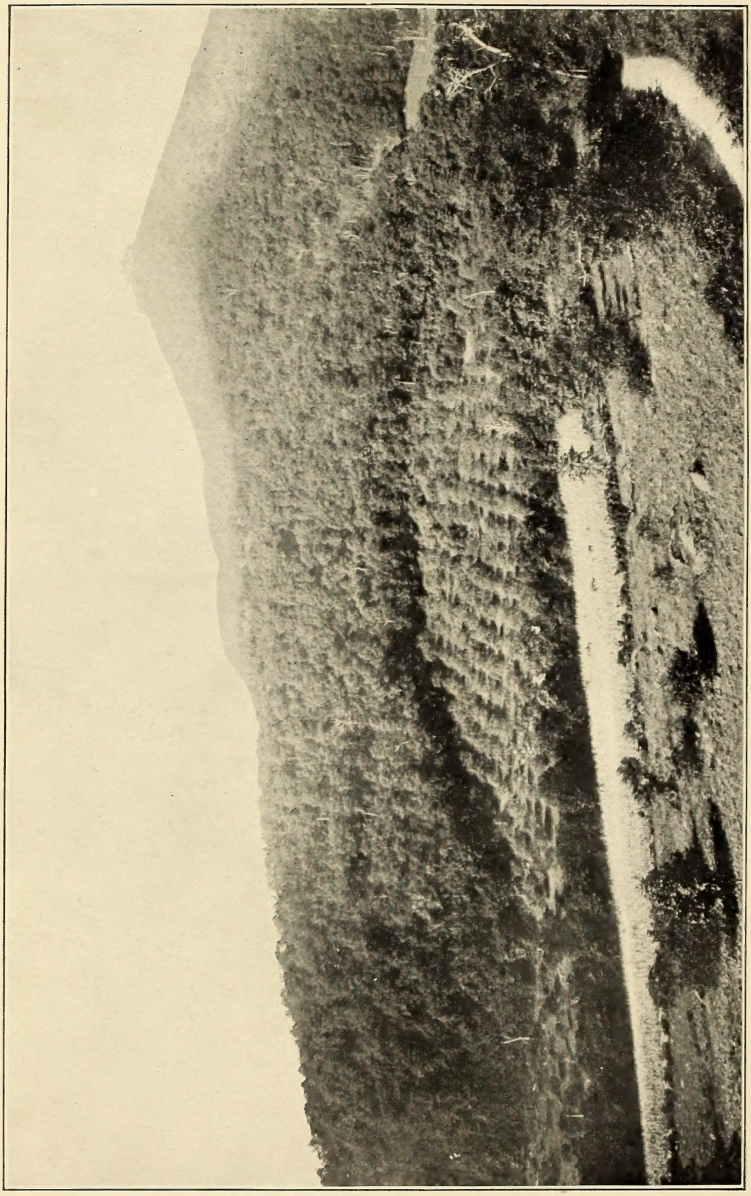

A TYPICAL MOUNTAIN APPLE ORCHARD ON THE NORTHEAST SLOPE OF SHARP PEAK (PEAKS OF OTTER), VA.

U. S. DEPARTMENT OF AGRICULTURE.
BUREAU OF PLANT INDUSTRY—BULLETIN NO. 135.
B. T. GALLOWAY, *Chief of Bureau.*

ORCHARD FRUITS IN THE PIEDMONT AND BLUE RIDGE REGIONS OF VIRGINIA AND THE SOUTH ATLANTIC STATES.

BY

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Office of the Chief,
Washington, D. C., July 11, 1908.

Sir: I have the honor to transmit herewith a manuscript entitled "Orchard Fruits in the Piedmont and Blue Ridge Regions of Virginia and the South Atlantic States" and to recommend that it be published as Bulletin No. 135 of the series of this Bureau. This bulletin was prepared by Mr. H. P. Gould, Pomologist in Charge of Fruit District Investigations, and has been submitted by Mr. William A. Taylor, Pomologist in Charge of Field Investigations in Pomology, with a view to its publication.

The fruit-growing interests in these regions have attained considerable importance, though their pomological resources are comparatively undeveloped at the present time. This is especially the case in the mountain region where there exist extensive sections which are doubtless of greater value for fruit growing than for any other agricultural purpose.

The determination of the behavior of varieties of orchard fruits under definitely stated conditions as here set forth is believed to be of value in guiding the planting of varieties in the further development of the fruit-growing industry of these regions. New orchards are constantly being planted, and their success or failure is in a large degree dependent upon the selection of varieties adapted to the conditions under which they are to be grown and suitable for the purposes for which they are desired. In the Blue Ridge region, where conditions of orcharding are very variable, due to differences in elevation and soil, very careful discrimination is of special importance in selecting varieties for planting. While the information here supplied will doubtless prove of value to prospective planters of orchards who already reside in these regions, it is expected that its greatest usefulness will be to those who are unfamiliar with the conditions, but who may be attracted to these sections by the opportunities which they offer for fruit growing.

Respectfully,

B. T. Galloway,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

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ORCHARD FRUITS IN THE PIEDMONT AND BLUE RIDGE REGIONS OF VIRGINIA AND THE SOUTH ATLANTIC STATES.

INTRODUCTION.

In explanation of the nature and object of the fruit district investigations of the Bureau of Plant Industry, of which the present paper is the first published report, the following general outline of the work may assist the reader in his understanding of their relation to the fruit-growing interests of the country.

That varieties of fruit are not equally well adapted to all conditions of soil, climate, elevation, etc., under which they may be grown is apparent to every fruit grower and to others who are in the habit of observing the behavior of fruit and fruit trees. The geographical limit of the profitable commercial range of many of the more important varieties of fruits is comparatively well known, yet within such limits there are many instances which might be mentioned of sections that are noted for the unusually high degree of perfection to which some particular variety attains in one or more of its important characteristics. The degree of perfection reached may be in the general appearance of the fruit or in its size, form, color, texture, flavor, time of ripening, or keeping quality, or in the productiveness, vigor, and healthfulness of the tree, etc. On the other hand, another section within the accepted commercial range of a variety may have a reputation for producing fruit which is strikingly lacking in some desirable feature.

While the commercial aspect of these investigations is the more important one from a financial point of view, it is necessary, also, to consider them from the standpoint of the home supply. The object for which fruit is to be grown must be taken into account in considering the merits and behavior of a variety. A particular sort may have characteristics which render it of special value in some locality for a given purpose, but it may be entirely unsuited to some other use. A variety which in a particular location is too small or has a very tender skin, or the tree of which is relatively unproductive,

would obviously not be commercially satisfactory; yet it may possess high dessert quality which renders it desirable for home use where the basis of merit is not the market value of the product.

The influence of conditions such as soil and climate upon the behavior of varieties, and consequently upon their relative value for any particular purpose, indicates the importance, and even the necessity, of determining those conditions or combinations of conditions which best meet their individual requirements, if the planting of fruits is to be done with the greatest possible assurance of success. Many orchards and fruit plantations have been set out in the past which have been unprofitable because varieties were planted which were poorly adapted to the conditions under which they were grown; or, if not resulting in actual loss, they have been less profitable than would have been the case had varieties been selected which were better adapted to the conditions.

The ability of a variety to reach a high degree of perfection, however, does not alone determine its profitableness or desirability for any particular place. Adequate means must be at hand for transporting the product from the point where it is grown to the consumer. Because of insufficient means of transportation, the commercial growing of fruit is rendered impossible in many sections that are naturally well suited to certain kinds.

In the case of quickly perishable fruits, like peaches, the exact time of ripening is also frequently an essential factor. It is often this feature which determines very largely the profitableness of a variety. If a particular sort ripens a few days earlier or later than some other one, it may be just in time to fill a period in the market when the supply would otherwise be light, and hence it is desirable on this account. Similarly, another variety may be undesirable because its season of ripening comes at the same time as some other variety which has a better commercial rating.

The time of ripening has a still wider application in the case of some kinds of fruit of which the range in the ripening period of all varieties in general cultivation is comparatively short. For instance, the commercial growing of strawberries is rendered unprofitable in many sections because the "strawberry season" comes at the same time as in some other sections where the berries grow equally well and which are more favorably located with reference to the markets, thus rendering successful competition impossible.

It will thus be seen that definite knowledge of the factors which influence the ripening period may be of great importance in considering the adaptability of varieties for particular purposes. For such reasons as these the fruit grower must consider not only whether a variety will do well under the conditions where he wishes to grow it,

but also whether he can place it upon the market at a time when remunerative returns will be reasonably assured.

It will thus be seen that the success of a variety must be measured by two standards—its ability to develop to a high degree of perfection and its commercial value in terms of profit and loss when placed upon the market. Under the conditions which exist in some particular locality, a variety may reach such a high state of perfection that little else could be desired so far as intrinsic merits are concerned, yet because of its season of ripening, lack of transportation facilities, or some other cause apart from the inherent qualities of the fruit itself it fails to yield a profitable financial return when offered for sale in the open market. While such a variety would be considered successful so far as its growth is concerned, it is at the same time unsuccessful as a commercial sort under these conditions, because it fails to meet the end desired of it. In some other locality where the opposing features do not exist it might yield a satisfactory financial gain, and hence be successful from a commercial standpoint.

A similar parallel might be drawn in regard to a variety intended for home use. However well the tree may grow or the fruit develop, if it fails for any reason to meet the desired end it can not properly be considered a successful variety to grow for that purpose.

In the varietal notes on later pages the necessary distinctions relative to what constitutes the "success" of a variety are made.

Many illustrations might be given of the fact mentioned in our initial statement that the conditions under which a variety of fruit is grown have a decided influence upon its behavior and value, and consequently upon its desirability for a given purpose, but the foregoing is sufficient to explain the nature of fruit district investigations. Their object is obvious. Briefly summarized, they are an effort to ascertain the limitations within which fruit varieties may be profitably planted, as indicated by the manner in which they respond to the influences of their environment, an effort to determine the adaptability of different varieties to different conditions and combinations of conditions.

It is not sufficient, however, to know merely that a certain variety is successful or unsuccessful, as the case may be, in a certain place. It is equally necessary to know, in as much detail as practicable, what the exact conditions are under which it is grown and to determine with all possible accuracy what each factor contributes to the success or the failure of the variety in question. This involves consideration of slope, soil, elevation (both actual and comparative), temperature, humidity, and all the other factors included in the term "climate," besides such other incidental or local conditions as may influence varieties in any way. The aim of these investigations is to

thus work out the requirements, in all the detail possible, of the different varieties of fruits, especially those varieties which appear to be of greatest commercial importance, for the purpose of aiding fruit growers in selecting those sorts which will be the most profitable and satisfactory for the purpose for which they are desired.

Incidental to the study of the adaptability of the more important and better-known varieties to the conditions which may affect them, these investigations also include a consideration of new and little-known sorts. New varieties of which but little is known concerning the requirements or their range of adaptability are being constantly introduced. Many varieties having decided merit where they are now grown are known only in the localities in which they originated. So far as practicable such varieties are investigated and their usefulness in the development of the fruit-growing interests of the country determined.

Again, a large majority of the varieties which are grown for commercial purposes are defective in one or more important features. For instance, the "Elberta" peach and the "Ben Davis" apple lack high dessert quality, yet both possess characteristics which render them valuable commercial sorts. Some are not sufficiently productive; others do not stand shipping sufficiently well; still others, which are desirable in most respects, develop faults in cold storage. Some defect might be mentioned which would apply to nearly every sort found upon the market at the present time. While the attainment of some preconceived ideal in any kind of fruit may not be possible, an effort made in the direction of a desired end can not fail to produce beneficial results. It is hoped that in these minute studies concerning the requirements which are necessary for the development of varieties to their highest degree of perfection, sorts may be discovered and introduced into the various commercial districts of the country which will not possess the more conspicuous defects of the important commercial varieties now in general cultivation.

In some sections the "variety problem" is a comparatively simple one, even over large areas, as in the prairie region of the Central West, where the soil conditions are fairly uniform and the elevation and other factors of influence are not sufficiently variable to require special consideration. But some of the mountainous regions offer the best locations for the growing of particular fruits, and in these regions the question of varieties becomes an exceedingly difficult one because of the great variation in the soil, the constantly changing elevation at which it is desired to grow fruit, and the corresponding lack of knowledge regarding many other conditions. The Piedmont and Blue Ridge regions of Virginia and the South Atlantic States represent such a section in the East. Numerous illustrations occur in the West. Under

such conditions only the most careful discrimination in the selection of varieties can give reasonable assurance of success, and in many instances the necessary information essential to the making of such discrimination is not yet obtainable. While a variety may be well adapted or not to the more or less broadly defined fruit districts into which any region, or even the whole country, may be divided, local factors often cause wide differences in its behavior in different localities within such a district. Where the soil lacks uniformity, where differences exist in slope or elevation, or where there is some special local condition, a variety may reach a high degree of perfection in one locality while it is practically worthless in another portion of the same orchard.

In the earlier days, when fruit growing was merely an incidental factor of farm life, it mattered little whether the orchard or fruit plantation bore an abundant crop or not. But little was expected, and if that little was received it was satisfactory. Within comparatively recent years the point of view has entirely changed, and with this change fruit growing has developed into a business quite distinct from general agriculture. It has become of increasingly great importance to the commercial interests as new regions have been developed, fruit growing in all its branches extended, and competition increased that every tree, shrub, bush, and vine should produce its maximum crop, maturing just at the right time and being of such quality and appearance that when offered for sale it will bring a maximum price. The more complete one's knowledge is of the different varieties of fruit and their requirements for the highest degree of development, the more nearly can these ideals in fruit growing be realized.

Another important factor to be considered is the "personal equation." The characteristics and ideals of the grower are potent influences in the behavior of the varieties under his care, and consequently upon their apparent adaptability to the local conditions under which they are grown. While soil, climate, and other features which in any way influence varieties are important and largely beyond the control of the planter except as he can meet these conditions by selecting properly adapted varieties, it frequently happens that the one determining factor in the success or failure of a variety is the way in which it is handled and cared for; in other words, the man himself. The grower in many ways controls the conditions under which his fruit develops, and no two men are likely to produce just the same conditions, even though the natural possibilities are the same. Hence it is that a variety under certain treatment will produce certain results, while in an adjoining orchard under other treatment the results may be very different. A single example will illustrate the point in question.

Two orchards are located side by side, both having similar natural advantages. One is well cultivated and sprayed; the other unsprayed and the soil impoverished. The fact that the fruit of a variety in the first orchard is large, finely developed, and free from insect and fungous defects and that in the second the same variety is small, imperfectly developed, and rendered worthless by its apparent susceptibility to some disease or insect is not due so much to the inherent merits or faults of the variety in terms of its commercial value for that particular locality as it is to the man in charge, as measured by the methods employed in caring for his orchard.

These fruit district investigations have a twofold basis of application. On one basis a variety is considered from the standpoint of its commercial value, and the influence upon it of the artificial conditions imposed by cultivation, spraying, and the other operations which go to make up the present-day progressive methods of orchard management is taken into account. By these methods the grower is able to overcome in a measure the natural or inherent susceptibility of a variety to disease and other kinds of imperfections. In this view of the case, the chief concern of the grower is to know that the variety in question will respond readily and completely to the influence of the artificial conditions which he is able to maintain and that under such conditions the commercial value of the crop will be relatively large in proportion to the cost of production.

The second point of view is the scientific aspect of the adaptability of varieties. In this phase of the investigations a variety is considered not under the forced conditions of a highly cultivated orchard with the application of every practicable means for increasing and perfecting the product, but rather under conditions where influences imposed by man are eliminated as completely as possible. If a variety thus develops under natural conditions—that is, with no special attention from man—its behavior may be taken as the expression of its innate characteristics and capabilities when grown under the natural conditions of soil, climate, etc., which exist in the particular place where it is grown. The ability of one variety over another to resist some disease, to develop to some special degree of perfection, or to manifest some other individual peculiarity is frequently noted in orchards which are in a much-neglected condition. While the commercial aspect is of the greater importance from a pecuniary point of view, the scientific phase is in reality the fundamental consideration. In conducting the investigations, the aim is to give each aspect the weight of its true significance.

As previously implied, the fundamental principle underlying the fruit district investigations has long been recognized and much valuable information accumulated in regard to the requirements of

many varieties of the various kinds of fruits. Much of the effort, however, which has been expended in this direction has been without definite system or plan, although in a comparatively few instances careful and systematic effort has been put forth toward the solution of specific problems. The efforts of a relatively small number of specialists have also been directed along certain well-defined lines. There has been little attempt, however, to correlate cause and effect, so that the practical application of the underlying principles in the adaptability of varieties to their environment has not been possible in any considerable degree in the selection of varieties for the extension of the fruit-growing interests to new territory.

The most comprehensive attempt to compile the available information relative to the adaptability of the varieties of the different kinds of fruits to the various sections of the country is the work that has been done by the American Pomological Society during the last half century through its committees appointed for the purpose. The result of these efforts has been published in the catalogue of that society from time to time and also in its most recent revision as Bulletin No. 8, Division of Pomology, of this Department. In these publications the country is divided into nineteen districts, and the varieties of the more common kinds of fruit which are considered best adapted to the different districts are recommended for planting. For obvious reasons these recommendations are general and do not take into account the local conditions which may exist in the districts.

The efforts of the Bureau of Plant Industry in its fruit district investigations are similar in many respects to the work done by the American Pomological Society in this direction, but the scope of the research carries the inquiry farther and considers in the minutest detail practicable the peculiarities and the requirements of varieties, and attempts, as far as possible, to correlate cause and effect. It thus becomes possible, within the limits of the information at hand, to select varieties with a view to their value in very restricted sections having local peculiarities as well as for the larger and more or less general districts now recognized.

SCOPE OF THE PRESENT INQUIRY.

This paper is a preliminary consideration of the territory under discussion. The conditions and their influence upon the varieties of the different kinds of fruit grown therein have not been studied in sufficient detail or for a sufficiently long period of time to warrant the making of many deductions which are not subject to revision as conditions become known more intimately and the varieties are studied under a wider range of climatic influences. It seems advisable, however, to issue a summary of the observations which have thus far been made.

In these investigations acknowledgment is due and gladly made of the assistance which the writer has received from numerous sources. The fruit growers of the regions under consideration have granted him the freedom of their orchards without restraint for the making of personal observations, and they have also given freely the results of their experience. In the identification of varieties, by helpful suggestions, and in many other ways the assistance of his associates in office has been invaluable.

The data for the following deductions have been obtained in various ways, but mainly by means of careful observations and studies of the varieties and their environments through personal inspection of the orchards, these studies being supplemented by the results of the experience and impressions of the growers as learned from them in interviews and by correspondence. The ideal method of investigating the adaptability of a variety is to study it from time to time during its development throughout the entire season, but as only a single inspection each year is practicable in most cases, the examination is made as nearly as possible when the fruit is mature, but before it has been harvested. The immediate local conditions under which the fruit has developed can then be best determined, and also their effect upon the varieties.

THE PHYSICAL AND CLIMATIC CONDITIONS OF THE PIEDMONT AND BLUE RIDGE REGIONS.

To say that a variety of fruit succeeds in any particular place or seems to be poorly adapted, as the case may be, signifies little or nothing in regard to the real merits of the variety in extending or developing the fruit industry, unless the conditions under which the variety is grown are also known. Its reported behavior may be the result of conditions which are entirely within the control of man and not necessarily subject to any natural features of the location where it is grown. On the other hand, the variety in question may be considered for planting in some other section where the conditions are similar to the location where it has produced known results. It then becomes of fundamental importance to be able to forecast, by a comparison of conditions and their influence upon the variety, what its value is likely to be for the purpose desired in the second locality. Hence, the behavior of a variety must be interpreted in terms of the conditions under which it is grown in order that its behavior shall have definite significance. It is therefore necessary to describe in considerable detail the more important conditions which exist in the regions under discussion, that the varietal notes which occur on later pages may have the widest possible application.

PHYSICAL DESCRIPTION OF THE REGIONS.

From a geological standpoint, Virginia and the South Atlantic States are divided into several regions. The natural physical divisions result from the geological formations, and hence conform closely to the geological regions in their extent. There are no sharply defined lines of demarcation between these different regions, each one extending by almost imperceptible gradations into the adjoining ones. The general direction in which they extend is parallel to the coast line.

What may be termed the "pomological regions" of these States are nearly coincident with the physical regions, and hence they may properly be referred to in the present connection.

The points wherein the physical and pomological regions do not correspond in location coincide mainly with differences in elevation. The map shown as Plate V indicates the location and extent of the pomological regions as nearly as it is possible to outline them from available data. By studying the contour lines, the approximate elevation and topography of any section within the boundaries of each region can be determined without difficulty. The relief map shown in Plate IV may also be of assistance in studying the topography of the territory under consideration.

The three most important divisions or regions which are common to all the States under consideration are called by various terms, but most frequently they are spoken of as the Coastal Plain, the Piedmont, and the Blue Ridge regions. These divisions are variously subdivided by different authors, but it is not necessary to consider them in detail in the present connection. It may be well, however, to note that in the Virginia section the eastern portion of the Piedmont region is frequently referred to as middle Virginia, thus restricting the Piedmont region to a relatively narrow strip of country adjacent to the Blue Ridge Mountains. There are also two other natural divisions which should be mentioned, one of which is known as the Appalachian Valley, while the other includes the Allegheny and Cumberland plateaus.

The Coastal Plain extends the entire length of the coast line of these States and varies in width from a few miles to 150 or 200 miles at some points. It is generally level, and the greater portion of its surface is but a comparatively few feet above sea level, except along its western limits, where it grades into the Piedmont region; here it reaches an elevation of about 500 feet at some points.

The section of the map (Pl. V) indicated by the lighter horizontal hatching (see legend on map) comprises the Coastal Plain and that portion of the Piedmont region which is below 500 feet elevation. In Virginia this includes a considerable section that belongs geologic-

ally to the Piedmont region, and to a lesser extent the same thing is true in North Carolina. The soil is mostly a light sandy type.

The Piedmont region lies between the Coastal Plain and the Blue Ridge. The border line between this region and the Coastal Plain may be said, for present purposes (though not geologically accurate), to extend in Virginia from Alexandria southward, through Richmond and Emporia, which is near the southern boundary of the State, across North Carolina and South Carolina in a southwesterly direction in the vicinity of Columbia, S. C., and into Georgia near Augusta. The border line between these two regions marks the position of the seacoast in former ages, the Coastal Plain being of comparatively recent geological origin.

The western boundary of the Piedmont region must be indicated in even a more arbitrary manner than the eastern since it is largely a matter of elevation, those points having 1,000 feet or less being generally considered in the Piedmont and those having a greater elevation than this in the Blue Ridge.

The topography of the Piedmont region is somewhat broken and rolling. (See Pl. II, figs. 1 and 2.) The elevation ranges from 150 to 500 feet along its eastern extremities adjacent to the Coastal Plain to 1,000 feet in proximity to the Blue Ridge. Numerous hills project above the general level, and some of the spurs of the Blue Ridge extend within its borders. (Pl. III, fig. 1.) Many streams rising in the mountains cross it, mostly in a southeasterly direction, while a large number of smaller streams and tributaries have their origin within the region itself.

The section of the map (Pl. V) indicated by the heavier diagonal hatching represents the pomological region which is most nearly coincident to the Piedmont. Its eastern border follows closely the 500-foot contour. Throughout nearly all of Virginia its western extremity has an elevation of about 1,000 feet, except south of the Roanoke River. From this region to its southern extremity in northern Georgia, its division from the adjacent region is made to follow in a general way the 1,500-foot contour because of the behavior of the fruits grown therein. The most common type of soil is a stiff red clay with various modifications containing more or less sand.

It should be stated in this connection that a majority of the orchards in the Piedmont region are confined to a relatively narrow strip, lying in comparatively close proximity to the mountains, where the elevation ranges from about 800 to 1,000 feet; hence the investigations in this region have been limited in their extent by the distribution of the orchards.

The Blue Ridge region included in this discussion, as it extends from the northeast to the southwest through Virginia, is contained in the Piedmont and Valley counties which have common boundaries

upon its crest, except in the southwestern portion of the State, where it expands into a relatively broad plateau. This same plateau extends across North Carolina, having its western boundary within the borders of eastern Tennessee. The Blue Ridge Mountains, which extend nearly the entire length of this region, with their foothills and spurs, constitute its eastern boundary. The range is more or less broken by spurs, ridges, detached knobs, and foothills having various altitudes. The highest point of this range in Virginia is "Flat Top" (Peaks of Otter), in Bedford County, with an elevation of 3,993 feet. (See Pl. I.) There are several other peaks having altitudes considerably above the general average of the range. In this portion of the region the investigations were confined principally to the eastern watershed of the range.

In North Carolina, with its boundaries extending from the Blue Ridge to the Smoky Mountains, the Appalachian Mountain system reaches its culmination. This plateau is divided by cross ridges, thus making smaller plateaus, each bordered by mountains and having its own system of drainage. Numerous peaks extending far above the general elevation of the mountains characterize the topography. There are 43 peaks within the State, each having an altitude exceeding 6,000 feet, including Mount Mitchell, with an elevation of 6,711 feet, which is the highest point east of the Rocky Mountains. There are a large number having altitudes only a few hundred feet less than this. The extremely rugged character of this section of the region is therefore apparent.

In South Carolina the Blue Ridge region is confined to a comparatively narrow strip following the northwestern boundary of the State. This is less rugged than the corresponding section of North Carolina, but includes several peaks of considerable altitude, the highest of which is Mount Pinnacle, having an elevation of 3,436 feet.

In northern Georgia the Blue Ridge region comprises the southern extremities of the Appalachian system. It is less rugged than the more northern portions of the system and naturally of lesser altitude, as it sinks into the lower levels of central Georgia.

On the map (Pl. V) the section indicated by vertical hatching represents mountain conditions and comprises the Blue Ridge Range with its spurs and detached knobs. The elevation is from 1,000 to 1,500 feet on its eastern border, as previously indicated, to 4,000 feet, though this elevation is seldom found in this region except in North Carolina. The elevation of the western border along the adjacent region is considered to correspond in elevation essentially to the eastern border. The soils are variable, representing several types, but as a rule they are rather loose and friable and well adapted to the growing of fruit.

It is in the foothills and on the lower slopes of the Blue Ridge, especially in the Virginia and North Carolina sections, that the fre-

quently mentioned "cove" orchards are located. (Pl. III, fig. 2.) These coves are the valleys between the ridges and spurs which extend from the main ridges. As a rule they are narrow, but often of considerable length. Usually the soil is a deep, black, friable loam and extremely rich. These coves are considered very desirable locations for orchards.

The section of the map (Pl. V) indicated by the lighter diagonal hatching represents the mountain region included in the Allegheny and Cumberland plateaus. It requires no special description in the present connection, as it is not included in the following discussion. The same statement applies also to the Appalachian Valley region. Geologically this valley is continuous throughout the entire length of the mountain system, but because of its elevation in southwestern Virginia it is considered a more accurate pomological representation of this section to place this portion of Virginia in the Blue Ridge and other mountain regions, as the map indicates.

The small, detached, green areas (Pl. V), found principally in North Carolina and West Virginia, indicate points exceeding 4,000 feet in elevation. There is but little attempt made to grow fruit at these higher altitudes because of their inaccessibility and the unfavorable climatic conditions which often prevail. Hence these areas are relatively unimportant from the standpoint of commercial orcharding, though it is probable that some varieties would prove to be adapted to these conditions, aside from periods of injurious climatic conditions, such as sleet storms, etc.

THE SOILS.

The relationship of soil to crop production is a matter of increasingly great importance, and the practice of selecting a particular type for the production of a specific result is constantly being given wider application in the most progressive lines of agriculture. While it may be true that the most marked influences of different soil types appear in the growing of annual crops—those which complete their life cycle in a single season—the effects of soil are also frequently noticeable and of great consequence in the production of such crops as orchard fruits, which occupy the land for a series of years. This fact is becoming better appreciated by fruit growers, and greater care is being exercised than formerly in selecting soils for orchard purposes. A soil rich in available plant food is essential to the best results, but doubtless its physical condition, in relation to its heat and moisture absorbing capacity, is of still greater significance than the mere quantity of plant food which it may contain.

In these Piedmont and Blue Ridge regions the soil types are numerous and variable. Two areas in the Virginia portion of these regions

have been surveyed and mapped by the Bureau of Soils[a] of this Department. One of these areas includes the principal fruit-growing portions of Albemarle and Nelson counties, and the other an important portion of Bedford County. The types of soil described and mapped in these two areas are fairly typical of much of the territory included in this discussion.

The description of the soil types which follows is condensed from the reports of Mooney, Martin, Caine, and Bonsteel and represents the soils of these regions which are the most important to the fruit-growing interests concerned.

CECIL LOAM.

Cecil loam has a wide range of color, but the greater part of it has a yellowish, light or dark brown, reddish brown, or red shade. The surface soil varies from 6 to 12 inches in depth, averaging probably about 10 inches. It usually contains fine sand, and occasionally in proportions great enough to give the soil a somewhat sandy character. The subsoil also varies in color and texture. The principal type is a yellowish, occasionally slightly reddish, loam, grading into rotten rocks at a depth generally less than 36 inches. In the upper part of this loam subsoil there is a stratum of heavy texture, but beneath this the subsoil becomes lighter as depth increases. The soil and subsoil contain a large quantity of finely divided mica. It is a Piedmont soil, found in Virginia in Nelson and Albemarle counties, and in some other sections it extends well up the slopes of the foothills in many instances.

CECIL CLAY.

Cecil clay is the most important soil type in the Piedmont region. It is locally known in Virginia as "red land," and is the best of the Piedmont soils for general farming purposes. It is found on the rolling uplands, in the smaller stream valleys, on the slopes of the small isolated mountains of the plateau, and on the gentle slopes of the large mountains to an elevation of 1,000 feet above sea level. The soil is residual, derived from the weathering of granite, gneiss, schist, diabase, and other metamorphosed rock. It varies from a heavy, reddish brown clay loam to a stiff, tenacious red clay of varying depth, but with an average of 8 inches. The subsoil is a stiff, tenacious red clay to a depth of 36 inches or more. Sharp quartz sand and rock fragments are found in both soil and subsoil. Mica is usually present in the subsoil.

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[a] Field Operations of the Bureau of Soils, U. S. Department of Agriculture, for 1901, pp. 239–257; also Field Operations for 1902, pp. 187–238.

CECIL SANDY LOAM.

Cecil sandy loam is locally known in Virginia as "gray land." It occurs usually in small areas in the same section as Cecil clay, on level uplands and gentle slopes of the mountains. Its origin is the same as Cecil clay. The soil is a gray to yellowish sandy loam, the sand particles varying from fine to coarse. The average depth is about 6 inches. Fragments of angular quartz and of some other rocks are found upon the surface in varying quantities. The subsoil varies from a clay loam to a stiff, tenacious red clay. It is less fertile than Cecil clay as a rule and not well adapted to the growing of fruit.

PORTERS BLACK LOAM.

Porters black loam is found in small areas on the mountain tops and in depressions on their sides, usually at heads of mountain streams. It is a brownish black or jet-black loam, having a depth of several feet in some places, while in others it occurs merely as pockets of loam in the midst of huge bowlders. It is also commonly found in the coves and hollows between the mountain ridges. The average depth is about 15 inches. The subsoil varies from a yellowish brown clay loam to a reddish color. The soil is residual, being derived from the weathering of coarse-grained granite, gneiss, and other eruptive and altered rocks. Rock fragments from which the soil has been derived are found both in the soil and subsoil. This is the type commonly called "pippin land," because of the high degree of perfection to which the Yellow Newtown ("Albemarle Pippin") apple develops on it.

PORTERS CLAY.

Porters clay is similar to Cecil clay, but contains a larger percentage of bowlders. It is associated with other mountain soils on the slopes, generally at elevations exceeding 1,000 feet. The soil is a clay loam, of a reddish brown to red color, averaging 6 inches in depth. The subsoil is a stiff, tenacious red clay. Both soil and subsoil have been derived from granite, gneiss, schist, and other metamorphosed and eruptive rocks.

PORTERS SAND.

Porters sand is primarily a mountain type of soil, though considerable areas of it are also within the Piedmont region in certain sections. It is a residual soil consisting of a gray or yellowish sand, averaging about 8 inches in depth. The subsoil is usually a coarse, yellowish sand, which as a rule runs into disintegrated rock at a depth of 3 feet or less. Rock fragments are generally present in both soil and subsoil. On some of the lower slopes the fragments are small, giving the soil a gravelly character.

PORTERS SANDY LOAM.

Porters sandy loam is on the tops and sides of the mountains and comprises about three-fourths of the mountain area. It varies from a gray sand to a yellowish gray sandy loam, about 10 inches in depth. The subsoil is much the same as the surface soil, but in places grades into a reddish sand, becoming coarser in the lower depths. Angular fragments of rock similar to that from which the soil and subsoil have been derived are quite abundant.

MURRILL SANDY LOAM.

Murrill sandy loam is found on the uplands of Goose Creek Valley (Bedford County, Va.) and on the lowest slopes of the Blue Ridge Mountains. It is of heterogeneous origin. The subsoil is derived from the weathering of limestones and shales, and the soil from sand washed down from the slopes of the mountains upon the residual material. The subsoil varies from a red clay loam to a soft, sticky red clay, while the soil varies from a fine gray sandy loam to a coarse yellow sandy loam, depending upon the kind of rocks from which it is derived. Its average depth is from 8 to 15 inches. The soil is more or less rocky.

MURRILL CLAY LOAM.

Murrill clay loam is the most important soil type in Goose Creek Valley (Bedford County, Va.), but the areas are small except in one or two locations. It varies from a light to a dark brown clay loam, with an average depth of 10 inches. The subsoil is a brownish yellow clay loam, increasing in clay content with the depth. Fragments of shale and particles of chert are frequently found in it. The origin is partly residual from shaly limestone and partly sedimentary from the wash of the higher slopes along the borders.

A number of other types which are of value for fruit-growing purposes occur in these regions farther south than the soil survey referred to extends, but most of them are similar to types already described. Throughout the Piedmont region the prevailing type is Cecil clay or some slight modification of it. Cecil sandy loam and slight variations of it also frequently occur. In important sections of northeast Georgia the soil posseses but a small clay content, and instead of Cecil clay the most important type is a very red, loose, friable loam, containing more or less decaying rock fragments and possessing more than a usual degree of fertility. This soil is deep and the subsoil is similar to the surface soil. The areas of this type are intersected in many places by a more sandy loam. It extends into South Carolina, but the proportion of the more sandy types to the heavier loam is probably greater than in Georgia.

While the mountain soils at points south of Virginia are more variable than those of the Piedmont region, they generally possess the loose, friable character of the mountain types which are found in the Virginia section of the region previously referred to. In some places a heavier clay soil than is usually the case in Virginia is found at considerable elevations.

THE CLIMATE.

In the Encyclopedia Americana, Moore defines climate as the sum of the atmospheric conditions as recorded for a long period of time, or "the totality of the weather." Weather is the physical condition of the atmosphere at a given time or for a limited period. We speak of the weather of to-day or of last week, and the weather which prevails in a place for an indefinitely long period of time makes the climate of that place. Climate includes, as stated by Moore, "atmospheric pressure, temperature, rainfall, snowfall, time and frequency of frosts, extremes of heat and cold, direction and velocity of wind, the amount of air that flows from the different points of the compass, amount and intensity of sunshine, humidity and transparency of the atmosphere, and its electrification."

It has been said that climate affects the health, happiness, and well-being of people more than any other factor that enters into their environment. If this is true of climate in its relation to man, who is able, in a measure, to protect himself against adverse climatic conditions, it is obvious that it has a still wider application in relation to plant life, with which there is no self-protection except by slow adaptation.

That climate, or some element of it, is an important factor in controlling the distribution of plants, both cultivated and wild, is readily apparent. For instance, those fruits which are characteristic of the Temperate Zone are not able to endure the low temperature of the extreme north or the relatively high temperature of lower latitudes. The same is true of the fruits which are native to tropical or subtropical regions. Moisture is equally as potent as temperature in determining the range of plant growth, whether it be orchard fruits or wild plants. This is seen in the behavior of plants during severe drought or of plants native to a humid climate as they approach their limits of growth in the direction of arid or desert regions.

Between the extremes of temperature and moisture, together with the other elements of climate, there is every possible gradation, and the infinite number of combinations of temperature and moisture are manifested in some degree in terms of plant life. At one extreme there is an abundance of heat and a minimum of moisture, producing desert conditions where only specialized forms of plant life can endure. At the other, a maximum of both heat and moisture, where the lux-

uriant growth of the rainy tropics prevails. With a minimum of heat and moisture in the form of ice and snow, moss and other plants of a relatively low order prevail, as in the Arctic region.

The rainfall of a place is influenced largely by the configuration of the earth's surface, the direction and height of mountain ranges, and the direction of the prevailing winds. The temperature is governed mainly by latitude, elevation, and proximity to large bodies of water, especially if these are very deep. However, the necessary combinations of temperature and moisture to produce a maximum plant growth or crop of fruit seldom, if ever, exist. The combination which would produce the greatest vegetative growth might not be the most desirable for fruit production.

Slight differences in climate, especially in temperature and moisture, often make great differences in the development of plant life. In this connection, however, it should be noted that a high temperature for a relatively short period often hastens maturity more than a higher mean temperature which does not reach the requisite extreme for a short period. In other words, within the climatic range of a plant the mean temperature is of less relative importance than a suitable range of temperature during the critical periods of the plant's life.

Comparatively slight differences in moisture are equally conspicuous, as when a "timely rain" insures the perfect development of some crop and in the absence of such a rain a light harvest is the result.

While such readily apparent results may obtain only with those crops which complete their growth in a short period, they at the same time emphasize the fact that climate has much to do with the development of plant growth. And what is true in principle in its relation to plants which mature in a short period of time is also true in principle in its relation to plants, such as orchard trees, which require a long period to fulfill their purpose. This is especially noticeable in the relative times at which the annually recurring epochs, such as blossoming, putting forth of the leaves, ripening of the fruit, etc., take place from year to year.

There is an unfortunate lack of data relative to climatic conditions which actually exist in orchards. Nearly all the available climatological records have been made at stations located in towns or at points more or less distant from orchard sites; hence, the best available records frequently do not accurately represent the climatic conditions which have prevailed in orchards, even in the sections where the records have been taken. Such records, however, are not without value for the present purpose, inasmuch as they furnish a means of comparison, in a general way, of different fruit-growing sections. Tables I, II, III, and IV, giving a monthly summary of the maximum, minimum, and mean temperatures and amount of precipitation, are taken from the Monthly Weather Review issued by the Weather Bureau

of this Department and are of interest in showing certain general climatic features of the Piedmont region. Corresponding data from the Coastal Plain are also inserted for comparison. As will be noted, the records are the monthly summaries for the years 1902 and 1903. The records of not less than two years are desirable for such comparison, because of the climatic differences which frequently occur from year to year, even in the same locality. The special reason for selecting the data for 1902 and 1903 in the present case is because of their application to the phenological data appearing on later pages.

TABLE I.—*Climatological records for Bedford City and Petersburg, Va., 1902 and 1903.*

	1902.				1903.			
	Temperature.			Precipitation.	Temperature.			Precipitation.
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.	
Bedford City (elevation, 947 feet; approximate latitude, 37⅓°):	°F.	°F.	°F.	Inches.	°F.	°F.	°F.	Inches.
January	55	13	34.6	.....	65	12	36.2	5.14
February	68	12	33	5.40	70	6	41.9	5.48
March	75	19	48.4	3.86	79	29	53.6	5.63
April	90	32	55.1	1.73	89	25	57.4	2.92
May	95	41	69.6	1.91	98	38	68.8	.77
June	102	46	73.6	4.58	91	45	70.4	8.04
July	101	56	79.6	2.49	100	51	79.2	1.79
August	96	53	76	2.34	98	56	76.8	4.06
September	95	39	68.3	1.94	92	40	70.1	2.97
October	82	35	58.8	6.52	84	35	60	.....
November	78	25	54.5	2.17	80	19	45.8	.....
December	65	12	38.1	2.86	50	12	33.2	.....
Petersburg (elevation, 14 feet; approximate latitude, 37¼°):								
January	69	14	36.8	2.95	58	16	36.9	2.72
February	69	7	34.4	5.67	72	10	42.2	5.52
March	81	17	50.9	2.60	77	25	53.7	8.11
April	89	29	56.2	3.53	89	37	57.2	4.63
May	92	43	67.6	3.86	98	40	66.8	3
June	98	51	72.7	3.47	87	48	69	10.25
July	101	56	79.4	3.87	96	57	77.9	4.31
August	97	54	74	4.42	99	62	75.5	4.85
September	90	42	68.2	4.43	89	40	69.4	3.12
October	83	31	61	2.53	85	31	58.8	4.45
November	79	26	55	2.50	77	18	45.6	1.33
December	68	17	40	3.32	58	15	35.2	2.52

TABLE II.—*Climatological records for Lenoir and Kinston, N. C., 1902 and 1903.*

	1902.				1903.			
	Temperature.			Precipitation.	Temperature.			Precipitation.
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.	
Lenoir (elevation, 1,186 feet; approximate latitude, 35⅞°):	°F.	°F.	°F.	Inches.	°F.	°F.	°F.	Inches.
January	68	10	37	2.80	64	10	36.6	5.06
February	67	9	33.7	2.66	70	9	40.6	8.80
March	77	20	47.8	4.23	76	23	53.4	11.15
April	84	27	51.8	1.73	82	19	53.8	5.36
May	93	41	69.4	2.33	96	42	67.6	.74
June	96	47	70.8	6	89	42	62.4	4.69
July	96	52	73.5	1.99	93	51	75.4	4.16
August	96	51	74.8	.90	94	58	75	4.87
September	93	37	66	4.17	90	38	67	2.49
October	84	31	58.3	4.82	.....	.....	.....	3.10
November	79	26	53.1	4.11	80	12	44.8	3.06
December	.....	.....	.....	.....	60	10	36.9	1.87

TABLE II.—*Climatological records for Lenoir and Kinston, N. C., 1902 and 1903*—Con.

	1902.				1903.			
	Temperature.			Precipitation.	Temperature.			Precipitation.
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.	
Kinston (elevation, 45 feet, approximate latitude, 35¼°):	°F.	°F.	°F.	Inches.	°F.	°F.	°F.	Inches.
January	73	15	41.3	1.01	71	18	43	2.96
February	76	19	38.4	6.70	74	16	48.4	5.91
March	83	22	54.9	3.04	81	34	60	8.05
April	89	30	61.2	2.34	86	30	56.7	2.99
May	97	44	72.8	2.64	95	45	67.6	3.91
June	100	50	77.5	3.92	.....	.....	.....	.....
July	104	60	82.6	2.69	97	60	79.4	8.07
August	99	52	78.6	8.91	97	62	79.6	6.83
September	91	46	72.6	2.76	88	41	71.5	.89
October	84	31	62.9	5.13	86	27	57.4	3.28
November	81	31	57.2	4.14	.....	14	.....	.....
December	71	16	45.5	1.82	63	15	36.2	1.99

TABLE III.—*Climatological records for Conway, S. C., 1902 and 1903.*

	1902.				1903.			
	Temperature.			Precipitation.	Temperature.			Precipitation.
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.	
Conway (elevation, 25 feet; approximate latitude, 33⅞°):	°F.	°F.	°F.	Inches.	°F.	°F.	°F.	Inches.
January	80	18	43	1.16	75	21	46.4	4.24
February	77	20	42.2	5.81	77	23	51.2	3.75
March	82	25	55	3.25	80	38	62.8	5.59
April	86	33	60.6	1.08	87	34	60.8	2.50
May	94	48	72	2.50	99	49	70.4	1.60
June	100	57	77.1	4.20	94	52	75	4.74
July	104	64	82.1	1.80	98	59	80.2	2.20
August	98	59	79.4	8.25	100	65	81.5	8.42
September	92	54	73.4	6.03	93	49	72.6	1.88
October	87	35	66.2	5.94	85	29	61.5	3.34
November	82	31	59.6	3.94	80	15	52.2	.91
December	72	18	47.8	6.80	68	17	41.2	3.35

TABLE IV.—*Climatological records for Gainesville, Ga., 1902 and 1903.*

	1902.				1903.			
	Temperature.			Precipitation.	Temperature.			Precipitation.
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.	
Gainesville (elevation, 1,227 feet; approximate latitude, 34¼°):	°F.	°F.	°F.	Inches.	°F.	°F.	°F.	Inches.
January	60	20	38.7	2.83	66	16	38.5	4.09
February	59	15	35.5	9.40	65	15	43.2	11.81
March	68	21	48.2	9.40	71	31	55.4	12.17
April	83	33	57.2	1.76	81	34	56.8	2.80
May	92	47	72.1	3.41	91	46	67.5	4.79
June	98	59	76.8	2.01	89	45	70.4	6.03
July	99	62	80	3.85	95	60	78.4	2.15
August	99	62	78.1	3.02	95	65	78.4	3.83
September	92	48	69.2	7.05	93	47	69.8	4.98
October	80	36	61.2	3.26	.....	.....	.....	.....
November	73	28	56.2	4.31	72	17	47	3.10
December	64	14	42	6.15	55	13	37.2	2.41

By making general comparisons month by month among the several locations a fair understanding of the climatic conditions, so

far as they can be represented in tabular form, may be had. The usual extremes of temperature are made apparent, and some idea of the rainfall can be obtained in this manner. It should be remembered, however, that these data represent in most cases town conditions, not actual orchard observations. And, further, in considering the elements of climate, such as moisture and temperature, with respect to their influence on any plant, it is necessary to take into account the condition of the plant in question at the time or during the period in which the particular element prevailed. For instance, peach buds when completely dormant may endure a certain low temperature without injury. If, however, the same temperature prevails after the buds have started in the spring or following a warm period during the winter, they may be entirely killed.

While the climatological data just tabulated may approximate the conditions which prevail in the Piedmont orchards, they can not be applied to the mountain region. Accurate data applicable to the mountain orchards are as a rule even less readily obtained than those for orchards in the Piedmont region. It is not unusual, however, as observed by some of the residents of the mountain districts, for the temperature to drop considerably below zero during the winter at some of the higher altitudes. The character of the native growth indicates climatic conditions similar to more northern latitudes.

There are many local climatic factors which can be determined only by a close study of the localities in question, such as danger of or immunity from frosts, the usual course of local showers, and many other features of importance.

There is one feature noticeable in some portions of the mountain region that is worthy of special mention. This is the "green belt," "thermal belt," or "frostless zone," as it is variously called, which extends in many places along the slopes of the Blue Ridge and its spurs, with southeastern to southwestern exposures. Where this belt occurs many kinds of vegetation remain green for a considerable time after all vegetation both below and above has been killed by frost. It is not until the severe freezes late in the season occur that the plants in this belt are injured. Concerning this thermal belt J. W. Chickering, jr., writing in the American Meteorological Journal for October, 1884, quoting Silas McDowell, of Franklin, Macon County, N. C., says:

> Amongst the valleys of the southern Alleghenies sometimes winter is succeeded by warm weather which, continuing through the months of March and April, brings out vegetation rapidly and clothes the forest in an early verdure.
>
> This pleasant spring weather is terminated by a few days' rain, and the clearing up is followed by cold, raking winds from the northwest, leaving the atmosphere of a pure indigo tint, through which wink bright stars; but if the wind subsides at night the

succeeding morning shows a heavy hoar frost; vegetation is utterly killed, including all manner of fruit germs, and the landscape clothed in verdure the day before, now looks dark and dreary.

It is under precisely this condition of things that the beautiful phenomenon of the "verdant zone," or "thermal belt," exhibits itself upon our mountain sides, commencing at about 300 feet vertical height above the valleys, and traversing them in a perfectly horizontal line throughout their entire length, like a vast green ribbon upon a black background.

Its breadth is 400 feet vertical height, and from that under, according to the degree of the angle of the mountain with the plane of the horizon. Vegetation of all kinds within the limits of this zone is untouched by frost; and such is its protective influence that the Isabella, the most tender of all our native grapes, has not failed to produce abundant crops in twenty-six consecutive years; nor has fruit of any kind ever been known within these limits to be frost killed, though there have been instances where it has been so from a severe freeze. The lines are sometimes so sharply drawn that one-half of a shrub may be frost killed, while the other half is unaffected.

The same writer states, further, that—

The thermal belt must exist in all countries that are traversed by high mountains and deep valleys, as the natural causes that produce it are as infallible as those which produce the rainbow in the clouds, and the only reason why its visible manifestations are peculiar to our southern Alleghenies is the fact that their precocious spring vegetation is sometimes killed by frost, while the same thing does not happen in the mountains farther north.

The above statement that "the thermal belt must exist in all countries traversed by high mountains" may be too general, and the ultimate causes which produce it may not be as simple as this writer appears to think, though doubtless the explanation is contained in the influences which produce a stratification of air at different temperatures. However, the important fact to be noted is that in the mountain regions under consideration this green belt does exist to a greater or less extent and contributes its portion to the natural advantages for fruit growing which the region possesses.

Late spring and early fall frosts are other important factors to be considered in studying the climatic conditions of a section with regard to its suitability for fruit growing. Frequently it becomes a matter of local consideration, as when there are "pockets" or valleys into which cold air settles and from which it can not readily escape. Such places are subject to unseasonable frosts. In the application of this feature to the regions in question it is sufficient to say that as a whole there is comparative freedom from such frosts. It sometimes happens that during the winter, mild weather which causes the swelling of the buds is followed by disastrous freezes, but the more favorably situated portions of these regions may be considered as relatively free from such dangers and as little subject to extremes of temperature as any of the more important fruit-growing sections east of the Rocky Mountains.

THE POMOLOGICAL ASPECT OF THESE REGIONS.

The natural advantages of the Piedmont and Blue Ridge regions render them of special value for the growing of certain kinds of fruit. The elevation is relatively high, ranging from 150 to 500 feet where the Piedmont region joins the Coastal Plain to that of the loftiest peaks east of the Rocky Mountains. The more extensive types of soil are not only fairly fertile, but they possess physical characteristics which make them well suited to this purpose when the necessary attention is given to the selection of proper varieties for the different types. The climatic conditions are also favorable in a high degree to the growing of many kinds of fruit.

With these advantages of soil and climate there is also the advantage of relatively close proximity to the great markets of the East and to shipping points for the export trade. With good transportation facilities both north and south, successful competition with other fruit-growing regions is made possible.

Fruit growing in these regions, however, is only slightly developed in comparison with the possibilities which exist in this direction. The methods of orchard management are commonly faulty and not productive of the best results which the natural advantages make possible. Notwithstanding these conditions, large quantities of excellent fruit, but principally apples, are grown in some portions of these regions, notably in the Virginia and North Carolina sections, and to a lesser extent in the other States included in the territory under discussion. In the South Carolina section there are very few orchards of commercial size, while in northern Georgia commercial fruit growing has been given much attention during the past few years. In certain sections of the latter State peaches have been planted extensively; apples have not been planted as much, but the possibility of growing some varieties to a high degree of perfection has been clearly demonstrated. The rather loose, friable soils of the southern Blue Ridge region of this section of Georgia, together with an abundant rainfall and relative freedom from late spring frosts, make this section especially well suited to the successful growing of a great variety of Temperate Zone fruits.

THE VARIETY PROBLEM.

In the consideration of the varieties that have been observed under the conditions which exist in the regions in question, the following points should be noted.

When the study of the varieties was begun, the serious confusion existing in the nomenclature at once became apparent and has been encountered throughout these investigations. Frequently some local name has become attached in different sections to a well-known va-

riety, and these local names, varying in different localities, have added to the confusion. The aim has been, so far as possible, to properly identify these varieties and to refer to them in the following varietal notes under the leading names which conform to the rules of nomenclature of the American Pomological Society. The more common synonyms are also given in italics.

The varieties referred to in the pages which follow do not include all that are grown in the regions in question, but it is not known that any important ones are omitted. In some cases a variety has been mentioned during the course of these investigations by only one grower, and the information secured concerning it has been too meager to warrant any reference to it at this time. In other cases varieties have been omitted because their identity was uncertain, and in all this work the importance has been emphasized of knowing beyond reasonable doubt the correct identity of each variety under consideration. If this point be not insisted upon, the merits or demerits of a particular sort would frequently be ascribed to some other one, thus making the deductions unreliable. Still others have not been mentioned because of their lack of importance and the limited space. In this connection, however, it should be stated that it has not been possible to make personal examinations of many of the stone fruits or of the early-ripening varieties of apples which are mentioned, because of the fact that the later apples constitute the most important fruit crop of these regions, and it has been found necessary to make the field investigations with reference to the late apples rather than to the relatively less important stone fruits and early apples. Hence, in the majority of cases it has been necessary to depend almost entirely upon the information and experience of the growers for the data relative to these fruits.

An effort has been made to study the different varieties under representative conditions, but not all conditions could be observed. It must necessarily follow that where a variety is being grown on a different soil, at a different elevation, or even under some other method of treatment than those observed, there is likely to be a corresponding difference in behavior of the variety itself. Hence, the notes relating to varieties may not in every case accord with the experience of all the growers in these regions who are familiar with them.

APPLES.

Apples are by far the most important commercial fruit grown in the Piedmont and Blue Ridge regions under consideration except in northern Georgia, where peaches are relatively of greater importance. The range of varieties is large, though the commercial sorts which are extensively cultivated are relatively few in number. This territory,

especially the Blue Ridge region, is rich in local varieties and seedlings which are not being propagated in any nursery and are known only in the localities where they are grown. It is probable that some of these local sorts may fill an important place in the future development of apple culture in these regions. Some of them have received local names, but many have no particular designation. They present a most promising and attractive field for investigation, but are not considered, except in a few instances, in the following varietal notes.

VARIETIES.

Arkansas. Synonym: *Mammoth Black Twig.*

This variety—more commonly mentioned by its synonym than by its leading name—has been planted in but relatively few orchards. The trees are all comparatively young; hence the adaptability of the variety and its value in these regions have not yet been fully determined.

The tree is a fairly vigorous grower, making a rather broad, roundish head. The original tree, which is still standing and in a fairly healthy condition, though it has been badly broken by storms, is said to be nearly 80 years old. While it usually begins to bear more or less at 5 or 6 years of age, it has thus far proved a shy bearer in most cases in these regions and not more regular in bearing than many of the heavier producing sorts. The fruit is medium to large; nearly solid red when highly colored; good to very good; season, winter. The qualities of the fruit when well grown render it desirable either for home use or for market purposes, but lack of productiveness thus far in these regions renders it of doubtful value commercially.

Though generally beginning to bear at a comparatively young age, this variety appears from present indications to be less precocious at the southern extreme of these regions. This characteristic has been noted especially in northeastern Georgia on sandy loam soil with friable loam subsoil at an elevation of 1,400 feet. Under these conditions it is said to be a better keeper than the Winesap grown under similar conditions. Some trees located in Amherst County, Va., at an elevation of about 1,500 feet and on Porters black loam with red clay subsoil bore their third full crop of fruit when 11 years old. Larger crops are reported in this location than elsewhere in these regions. Other conditions of soil and elevation under which good fruit is produced are Porters clay with elevations of 1,000 to 1,500 feet, and Cecil clay, 800 to 1,000 feet altitude. Murrill clay loam and Cecil sandy loam having elevations of 1,000 feet do not seem to give as good results as the other conditions mentioned. The tendency to lighter bearing and greater susceptibility to disease is said to be more pronounced under the last-named conditions. The fruit is small and the trees unproductive in the southwestern part of North Carolina at an elevation of 2,500 feet or more. In Albemarle County, at points of 500 feet elevation, on Cecil loam, the Arkansas apple has proved unsatisfactory thus far, the claim being made that it lacks color and flavor.

These deductions must be accepted merely as indications of the tendency of this variety in the regions mentioned, not as definite conclusions, since, as already stated, the trees are still too young for the mature characteristics of the variety to manifest themselves.

Arkansas Black.

But very few of the orchards in these regions contain this variety. The only one in which it has been studied is located in the southwestern part of North Carolina. The soil in this orchard is a loose, friable, reddish loam; the elevation is from 2,600 to 2,800 feet. Under these conditions it possesses very little to commend it for any purpose,

the fruit being small and very susceptible to the scab fungus, and the tree, though fairly vigorous, is unproductive. As these same characteristics have been observed to a greater or less extent in some other sections of the country, it is apparent that this variety should be planted only sparingly until its value has been demonstrated. In some sections of the country, however, it has become of considerable commercial importance.

Baldwin.

Though one of the most important winter sorts in the North, the Baldwin apple is relatively unimportant in these regions. It is widely distributed throughout them in the older orchards, but especially in the Virginia portions. The tree is rather irregular in bearing in most of these orchards and the fruit frequently drops badly, particularly at the lower elevations. In the mountain orchards, fruit of exceptionally fine appearance for the variety is often produced. Its behavior in typical Piedmont and Blue Ridge locations is indicated as follows:

On Porters black loam at elevations of 1,500 to 2,500 feet, probably also on Porters sandy loam at similar elevations, fruit of high quality for the variety and of excellent appearance, which may be expected to keep until the holidays under favorable conditions is produced. Good fruit is produced on Porters clay at 1,500 feet elevation, but it does not have the keeping qualities of that from higher altitudes. In other sections, particularly in Bedford County, Va., it is growing to some extent on other types of soil, such as Cecil clay, Cecil sandy loam, and Murrill clay loam, with an elevation of 1,000 feet or less. Under these conditions it matures as early as September and frequently rots and drops before it is ripe. The fruit from such locations is inferior in flavor and appearance in comparison with that from mountain orchards. These characteristics appear in some degree in all the Piedmont soils and elevations from Virginia to Georgia, but a few growers who have the Baldwin apple in mountain orchards, particularly those in the northern portion of the Blue Ridge region, find it fairly satisfactory for local markets. There are other varieties, however, which are more reliable and better adapted to these conditions.

Ben Davis.

There are few varieties of fruit as widely distributed in as many sections of the country as the Ben Davis apple is, and in the Piedmont and Blue Ridge regions it is one of the comparatively small number of varieties which has attained a recognized commercial importance. The tree has no conspicuous faults; it begins to bear moderately early, usually producing considerably by the time it reaches 6 or 7 years of age; the crops are produced mainly in alternate years. The fruit when well grown is very attractive in appearance and is valuable for its keeping and shipping qualities, but is notoriously poor in dessert quality.

In general, it may be said that this variety is well adapted to the conditions in these regions, aside from those at the highest elevations, though there are some apparent exceptions to this, which are probably due to local influences. In the Georgia and South Carolina portions of the Piedmont region and extending to an elevation of perhaps 1,400 or 1,500 feet some excellent results have been obtained with it where the trees have been given moderately high culture and thoroughly sprayed. Fruit grown under these conditions, however, should be marketed by the holidays, as it may be expected to deteriorate rapidly if held later than this. Grown under conditions of neglect in the southern Piedmont, the fruit is likely to drop prematurely and often fails to color properly even when it remains on the trees until a comparatively late date. On the other hand, it is of interest to note that where it is grown in North Carolina at elevations exceeding about 3,000 feet the fruit develops characteristics similar to those which appear when it is grown in northern latitudes, the characteristics being quite different from those developed in sections to which the variety is well adapted. The elevations at which these characteristics become apparent naturally depends largely

upon the latitude, the high altitudes at southern points affording similar climatic conditions to lower altitudes in more northern sections. On Cecil clay at 800 to 1,000 feet altitude in the upper portion of the Piedmont region, the Ben Davis has generally given good results. Other types of soil common to the Piedmont region, such as Cecil loam, Cecil sandy loam, Murrill clay loam, and possibly some others, are probably less desirable types on which to grow this than Cecil clay. The latter and the types commonly found in the mountains within the altitude limits mentioned appear to give the most uniformly satisfactory results.

Bonum. Synonym: *Magnum Bonum.*

While this is one of the varieties which has been in cultivation many years and is quite widely distributed in these regions, it is seldom found except in the older orchards, and in these only in small lots. The tree is ordinarily a good grower and bears well, though quite largely in alternate years under usual conditions of culture. The merits of the fruit are such that as a September and October variety it is deserving of more general planting. While little or no effort has been made in these regions to develop a market for fall varieties, the high dessert quality of this one and its attractive dark red color, together with its medium size under favorable cultural conditions, would appear to make it a very desirable apple for supplying a fancy trade.

Very fine specimens are grown in Bedford County, Va., on Cecil clay, at an elevation of 1,000 feet. It does well at elevations of 800 to 1,000 feet on Cecil sandy loam in Albemarle County. In the upper Piedmont region, in Rappahannock County, Va., it is much prized, being marketed from the first of September to the middle of October, frequently at very satisfactory prices. The soil in the section referred to is a friable red clay loam, ranging in elevation from 1,000 to 1,500 feet. This apple is not well adapted to conditions prevailing at the higher elevations. On Porters black loam at 2,200 to 2,400 feet elevation the fruit is smaller than at lower points; in form and color it varies from the usual type, and its quality is relatively inferior. On a loose mountain soil in North Carolina at 4,000 feet altitude the quality of fruit from young trees is so inferior as to raise some question in regard to the identity of the variety. At another point on similar soil at about 3,000 feet it is said to do finely as a fall variety and bear regularly. In this instance it is thoroughly sprayed. This behavior, however, conflicts with the usual experience at the higher elevations.

Buckingham. Synonyms: *Fall Queen, Equinetely.*

This variety is not grown extensively in these regions and is seldom seen in orchards south of North Carolina. As a fall variety, it possesses fairly good dessert quality. It is usually productive and satisfactory on Cecil sandy loam and Cecil clay at 1,000 feet elevation; it is also considered valuable on Porters black loam at 1,200 feet. Very fine specimens have been found in some of the mountain orchards of western North Carolina on a friable clay loam with porous subsoil at an elevation of about 3,000 feet.

Buncombe. Synonym: *Red Winter Pearmain.*

This variety is in many of the older orchards, especially in the North Carolina portion of the regions under consideration. It is, however, of but little commercial importance and has rarely been included in the orchards of recent planting. Its season is late fall and early winter in the sections where it is most often found.

Cannon Pearmain. Synonyms: *Red Cannon, Green Cannon.*

The variety here named is peculiarly characteristic, in its distribution, of Bedford County, Va., seldom being found in any other section in these regions. It is of considerable importance in this county in the older orchards but has rarely been planted in the younger ones. Some growers claim there are two strains of the variety, one of which is designated as Red Cannon, the other Green Cannon. It is probable that these distinctions are only local with no constant differences between them. The tree attains large size and great age, frequently being found in good bearing condition at

from 75 to 100 years of age. The limbs are tough, not being easily broken by heavy crops of fruit or by storms. Under favorable conditions heavy crops may be expected in alternate years, with very light ones in "off" years. While the fruit is not of high dessert quality, it is considered by many growers to be the best "general-purpose" sort grown in this particular section, and it is prized for cooking, drying, and cider making as well as for dessert purposes. It usually sells well in southern markets, but is less desirable in the North than many other sorts. In certain instances it has proved very profitable.

In Bedford County, where it has been extensively studied, it is quite sensitive to the influence of the conditions under which it is grown. In general, it requires much the same conditions for its highest development that the Yellow Newtown apple does. These are described in considerable detail under that variety. A few specific facts regarding its adaptability may be mentioned. Porters clay at the higher points at which this soil type occurs gives good results; also Porters black loam at its usual elevations up to the limit of 2,500 feet at least. No observations have been made in the present connection at a higher altitude than this. In the Piedmont portion of this county it is rarely successful on the types of soil commonly found. Under these conditions the fruit rots and drops badly, and that which reaches maturity is usually small and inferior in appearance and flavor. Occasionally fairly good results are obtained from trees on Cecil clay and Cecil sandy loam, but such results are exceptional. Certain claims are made by some growers relative to the influence of soil upon the texture and color of the fruit, as, for instance, the development of a tougher flesh on the red clay soils than on other types. These claims, however, have not been verified.

Disharoon.

The distribution of this variety is very limited, even though it has been in cultivation for many years. The only specimens which have been found in connection with these investigations were grown in Habersham County, Ga., the county in which it originated. The fruit is only small to medium in size and not particularly attractive in appearance, but is of high dessert quality. It is therefore of value primarily for home use. In porous friable soils of the section mentioned, at an elevation of 1,200 to 1,500 feet, it does well.

Domine.

This variety is occasionally found in the older Piedmont orchards of Virginia, but it has not been planted in recent years. It does fairly well on all of the types of soil in the Piedmont region, but produces the most of its fruit in alternate years. In a high state of cultivation it would probably bear considerable fruit every year. In one orchard on Cecil sandy loam, at an elevation of about 900 feet, it is said never to fail to produce a partial crop. In this case it is receiving no special care. Its season of ripening is late fall and early winter.

Dula. Synonym: *Dula's Beauty.*

This variety is doubtless a seedling of the Limbertwig, as it originated from a collection of seeds of this variety which were planted for stocks. The general characteristics of the tree give additional evidence of such an origin. The tree, however, is more thrifty and vigorous than the Limbertwig. It originated at Lenoir, Caldwell County, N. C., from seed planted by Mr. J. A. Dula, who knows the variety as Dula's Beauty, but under the rules of the American Pomological Society this should be reduced to Dula. It has not yet been widely disseminated. It is a large, dark red, more or less striped apple of good dessert quality, keeps fairly well, and is a prolific bearer in the vicinity of its origin. It is considered an apple of much value as a long-keeping variety both for home use and for market, and is said to do well either on bottom land which is a sandy alluvial soil or on hills and ridges where the type approaches Cecil clay. The elevation where it is most grown is 1,000 to 1,200 feet.

Early Harvest. Synonyms: *Yellow Harvest, Prince's Yellow Harvest, Yellow Juneating.*

Of the early varieties this is more widely grown throughout the Piedmont region than any other sort. It is probably less frequently found in the Georgia portion of this region than in the other sections of it. It is used locally, however, and seldom shipped. No personal studies have been made; hence all data as to its behavior have been obtained through interviews with the growers. Elevations and soil types have been studied as for the later sorts.

It has been reported from Virginia growing at altitudes ranging from 800 to 1,600 feet and on nearly every type of soil common to these elevations in that State. It is being grown on many different types of soil at points south of Virginia, but it is confined generally to the elevations of the Piedmont region. It gives a high degree of satisfaction for its season from the middle of June at low elevations in the more southern latitudes to the middle of August or early in September at some of the highest points in North Carolina, where it occurs only rarely. In the middle Piedmont region its usual season is about July 10 to July 20.

Early Ripe.

Comparatively few growers in these regions are acquainted with this variety, but it is in a few of the Virginia orchards; it may rarely be found in other sections of the Piedmont region, but to a very limited extent.

The conditions under which it has been reported are essentially the same as those referred to under Early Harvest, and in the ideals of those who know the variety it fills much the same place that that variety does. In time of ripening it is about the same or a little earlier than Early Harvest. In certain important early apple-growing sections the Early Ripe is being planted extensively for commercial purposes.

Esopus. Synonym: *Esopus Spitzenburg.*

No important commercial plantings of this variety exist in these regions, but in very limited numbers trees of it may be found in a few widely separated orchards. Its value in most of these orchards is apparently very slight.

At the lower levels it usually drops prematurely, and even on Porters black loam at 2,000 feet elevation it often rots and drops seriously. At 3,000 to 3,500 feet altitude in North Carolina, on a rather loose loamy soil with porous subsoil containing more or less red clay, it develops more satisfactorily, keeps well into the winter, and does not manifest in any marked degree the defects observed at the lower levels. An apparent exception to the usual behavior of this variety is reported from Albemarle County, Va., at an elevation of about 1,000 feet and on what is probably Cecil clay soil. Under these conditions it is said to be unusually promising, as indicated by the behavior of a limited number of trees. The reported success of this variety in this location, however, is greater in the limited way in which it has been grown than experience elsewhere would have suggested as probable.

Fall Cheese.

This variety has been considerably confused in the Piedmont region, where it is more or less grown, with one or two other varieties. In some of the southern markets it is considerably sought after during its season, which in the middle Piedmont is September and early October. While apparently quite widely disseminated, it is not grown extensively and occurs rarely except in the old orchards.

The dessert quality of Fall Cheese is excellent, and for home use or for supplying certain trade demands it could doubtless be given more prominence than it has at the present time.

Fall Orange.

This variety is more often found in the older Piedmont orchards of the Virginia portion of these regions than at more southern points, but in this section its distribution is very limited. While not a heavy bearer, it is said to produce more or less fruit nearly every year. The fruit develops to a large size when well grown, acquires a rich yel-

low color, and possesses a pleasant flavor. For home use, especially, it would appear to possess considerable merit as a fall variety.

In Bedford County, Va., at 900 to 1,000 feet elevation on Cecil sandy loam, it has proved more satisfactory than most varieties have under these soil conditions. Here it reaches maturity the last of September, but may be kept until the holidays.

Fall Pippin.

This variety occurs in a few of the older orchards, particularly in Virginia, but it is unimportant in these regions. In the mountain orchards, where it is found, it generally bears good crops in alternate years, but in the Piedmont orchards it is apparently predisposed to decay and is of little value on this account. A difference of 500 feet in elevation makes considerable difference in the time of its reaching maturity. A similar difference is of course noticeable in the case of all varieties.

Fallawater. Synonym: *Tulpehocken.*

The distribution of the Fallawater apple is quite general in the Piedmont and Blue Ridge regions of Virginia in the older orchards, but it has rarely been planted in recent years, nor is it common south of Virginia. It is relatively unimportant here either for market or home use. The tree, though making a fairly vigorous growth, is short lived, twenty-five or thirty years being considered about the limit of time it may be expected to live. Fairly heavy crops are usually borne in alternate years.

Its behavior may be indicated as follows: At the lower levels of the Piedmont region in Virginia and along the foothills it reaches a very large size, and primarily on this account it drops badly. It is also subject to decay, almost the entire crop often being lost in this way. At elevations of 1,500 or 1,800 feet the fruit is generally smaller than at the lower levels and the dropping and other defects are less serious. At these higher points its season of maturity is late fall to early winter; in the Piedmont region it is a fall variety. In this connection it is of interest to note that in the northern fruit districts, where it is grown more or less, it can be held until well into the winter without difficulty. In a few instances trees on Cecil clay and Porters clay at an altitude of 1,200 feet have given good results, but as a rule the higher altitudes are to be preferred. In the northern portion of these regions trees on the red clay loams at altitudes of 1,000 to 1,500 feet formerly gave satisfactory results, but in recent years bitter-rot has been serious in this portion of the regions. This disease, however, can be controlled by proper spraying.

Gano.

The Gano apple is seldom found in these regions. From a limited observation it appears probable that it will correspond quite closely to the Ben Davis in its adaptability to conditions and in its general behavior in these regions.

Gilpin. Synonyms: *Carthouse, Romanite, Little Red Romanite.*

The Gilpin is a variety of minor importance, but is found occasionally in the older orchards. In localities where drainage is not perfect, both soil and atmospheric, it "clouds" badly. In locations in the middle Piedmont and Blue Ridge regions having elevations of 1,200 to 1,300 feet on Porters clay and Porters black loam it gives satisfactory results for the variety. It is an unusually long-keeping sort and is considered excellent for cider making.

Gravenstein.

The Gravenstein is a variety widely grown in many sections of the country, more especially in the North, but reported occasionally from Virginia and other southern points. While not fully tested in these regions, it is promising for its season, which in the central Piedmont region is during August. It is of value for cooking and for dessert and is one of the comparatively early sorts that is desirable for evaporating.

Grimes. Synonym: *Grimes Golden.*

The occurrence of this variety is quite general throughout these regions, and though not as yet grown extensively in many of the orchards, it is of recognized commercial

value, the importance of which is undoubtedly increasing. The tree is considered by fruit growers generally to be short lived, but no particular complaints of this kind have been noted by the growers here. However, most of the trees are still comparatively young. The tree is satisfactorily productive as a rule, though under the usual cultural conditions it has "off" years, as do most varieties.

Experience thus far indicates that the Grimes is a desirable variety to grow both for home use and commercial purposes in most of the Piedmont and Blue Ridge regions where conditions are suitable for the planting of apple orchards. The relative elevation appears to be a particularly important factor in its effect upon the durability of the fruit. Reference to its behavior at particular points will indicate the influence of conditions upon it. An orchard 12 to 15 years old in Bedford County, Va., on Porters clay, at 1,500 feet elevation with southeast exposure, produces fruit of unusual excellence, notable for its good size, fine yellow color, crispness of texture, and rich, spicy flavor. This orchard has had hardly fair care. The fruit of this variety from it reaches edible maturity early in October, but possesses good keeping qualities for the variety. On the same farm at a point having somewhat lower elevation and a looser type of soil it matures considerably earlier and is not of such excellent flavor as from the location above mentioned. Produced at elevations of 2,000 feet in the upper sections of the Blue Ridge region it may be kept under fairly favorable conditions until early winter. Grown on Cecil clay at 1,000 feet elevation it lacks the rich color and high flavor mentioned above, the size is somewhat smaller, yet this combination of conditions appears to meet the requirements of the variety fairly well. In certain sections on Murrill clay loam the fruit appears to be susceptible to certain fungous diseases, especially the so-called "cloud" or "sooty" fungus. But the location with reference to air drainage may account for this. At points south of Virginia at the elevations of the Piedmont region it is inclined to drop prematurely, but when grown at points having not less than 1,500 feet altitude it is highly prized in its season. One grower in the southwestern part of North Carolina has this variety at 2,500 to 2,800 feet elevation, and also at an altitude 400 to 600 feet higher. It is his experience that the fruit grown at the latter elevation will keep two months longer than that from the lower level. The fruit is also finer in appearance and more satisfactory in every way at the greater elevation. For best keeping qualities it should not be allowed to become too mature before picking.

Hoover. Synonym: *Black Coal.*

In the Virginia and North Carolina portions of the mountain region the Hoover is widely distributed, though mostly in small plantings, but it is not grown extensively in the Piedmont region. The orchards in South Carolina and Georgia seldom contain it. In the Virginia section it is usually found at the higher altitudes growing on Porters black loam. Under these conditions the color becomes very dark and glossy, often almost black; at lower levels it is somewhat dull in color and rather unattractive in appearance. Its season of maturity is late fall, but fruit from the orchards of greatest elevation may be kept until early winter. In North Carolina the conditions under which the variety is grown have not been as carefully studied as in Virginia, but in passing through the mountain sections one sees this variety very commonly. During the fall it is the one most often brought to the stations for sale to passengers on the trains.

Jonathan.

This variety occurs only rarely, and reference is here made to it because of the possible value it may possess for these regions. The tree is not always as vigorous as might be desired, but usually no serious difficulty exists in this respect. Fairly early bearing is a characteristic. Normally its season is late fall to early winter, but if grown at moderately high elevations it would probably reach maturity sufficiently late to permit of its being handled in cold storage, for which it is especially well adapted. It

possesses exceptionally high dessert quality and ranks as an important commercial variety in some sections of the country.

Its behavior in the few places in these sections where it is known to occur indicates that it is worthy of careful consideration by those who are planting orchards at elevations of 1,200 to 1,500 feet or more within these regions. The finest specimens found in these regions have come from the orchards which have the highest altitudes of any of those in the Blue Ridge. Observations have been confined to young trees.

Kinnard. Synonym: *Kinnard's Choice.*

This variety occurs at a few rather widely separated points in these regions, but the plantings of it are small, in most cases consisting of only a few trees. There appears to be no well-defined reason, however, why it has not been more generally planted than has been the case. Its good size, attractive, dark red color, and pleasing dessert quality are all factors in its favor, and so far as observed the tree appears to be productive and desirable in its habit of growth. Its season is late fall and early winter, but with proper handling it possesses fairly good keeping qualities. It is more nearly an annual bearer than most varieties.

The soil types and elevations where the Kinnard apple has been studied are the following: In Virginia, Amherst County, Porters clay, at 1,200 to 1,500 feet elevation; Bedford County, the same, also on Murrill clay loam at 1,000 feet. In Lumpkin County, Ga., in a sandy loam with rather loose porous subsoil, at 1,500 feet elevation; in Habersham County, under conditions very similar to those mentioned in Lumpkin County, also at about 1,700 feet altitude on a very friable, deep red loam with porous subsoil having a small content of clay. Under this range of conditions it has been uniformly successful and experience thus far warrants the conclusion that it is one of the most valuable varieties with fairly long-keeping qualities for growing at southern points.

Kittageskee.

In the southern portion of the Piedmont region it is said that the Kittageskee variety is one of the surest bearers of any with good keeping qualities. No personal observations have been made. The fruit is small, but its bearing proclivities commend it especially for home use. The soil in this portion of the Piedmont region is mostly a friable red clay or sandy loam, with elevations ranging from 1,000 to 1,500 feet.

Lawver. Synonym: *Delaware Red Winter.*

There are but few places in the eastern portion of the country where this late-keeping variety is grown extensively, yet it is widely distributed. It is of very slight importance in the estimation of nearly all who have had experience with it. It has been found at one point in the southwestern part of North Carolina at about 3,000 feet elevation, and also in northeastern Georgia. It is of no special value in either section, though it is said to bear well in North Carolina, which is quite contrary to its usual behavior in this respect in most sections where it is grown.

Limbertwig. Synonyms: *Red Limbertwig, Green Limbertwig.*

This is another one of the well-known varieties which was widely planted in the older orchards throughout the entire Piedmont region and to a lesser extent in the mountains, but it has seldom been planted in recent years. It is generally considered a standard winter variety in these regions, though not an important commercial sort. In some localities, especially certain ones in North Carolina, it is the only variety grown in any considerable quantity. The main axis of the tree is rather upright in habit of growth, but the smaller branches are considerably drooping. It is more regular in bearing than many varieties are. The fruit is seldom above medium size; color, as frequently grown, is a dull, unattractive red, but under the most favorable conditions it becomes a clear, deep red. In some seasons it has been quite susceptible to bitter-rot.

Its behavior may be outlined, as follows: Grown on Cecil sandy loam at 800 feet in the Virginia section, it is inclined to rot and drop even when given fairly good care. Cecil loam at corresponding elevations gives somewhat better results. With good care this apple reaches a rather high degree of perfection in the upper Piedmont and Blue Ridge regions on Cecil clay, Porters sandy loam, and Porters black loam at elevations of 1,000 to 1,300 feet; likewise, it generally does well on the clay loam soils of the Piedmont region in North and South Carolina and northeast Georgia. At the higher points in North Carolina conflicting results occur frequently. For instance, on a soil similar to Cecil sandy loam at 2,000 feet altitude, one grower claims that this variety possesses more good qualities and is more satisfactory than any other variety. Another one not far distant from the first considers it unsatisfactory in every way. It is quite possible in this particular instance that the question of soil moisture is the determining factor, the moister soil giving the better results. Again, on clay loam soils at 3,000 to 3,500 feet elevation the behavior is satisfactory, the fruit being much more juicy and larger and finer in every particular than it is under many other conditions. On the other hand, there are instances under nearly all of these conditions in which the rotting and dropping of the fruit are serious faults. Such results render impossible any general summary regarding its limits of adaptability.

McAfee.

So far as observed, this variety has not been planted intentionally in any portion of these regions, but in several instances it has been obtained through error and is being grown under some other name, usually the one for which it was bought. In the few places where this variety has been observed, however, it appears to grow and fruit well. It is an apple of fair size, prolific, and as a rule of excellent keeping qualities, often producing fruit when most other varieties fail. Its rather dull color makes it less desirable as a market sort than many others, and for this reason especially it is doubtful if it is likely to become of any particular importance in this region.

It does well, as noted, in the case of young trees on Cecil clay at 800 feet elevation. On Cecil sandy loam at 1,000 feet, where most varieties are at best of uncertain value, this is a fairly good winter sort, and at 1,500 feet on a loose, blackish sandy loam, which is a deposit washed from a Porters clay hillside and doubtless underlaid by this type, it is giving good results so far as its fruiting capacity is concerned. It bears more or less every year, and the specimens are very fine of the variety. Also at about the same elevation in North Carolina on a sandy loam soil with porous subsoil it is giving favorable results. Similar results are obtained in corresponding locations in northeastern Georgia.

Maiden Blush.

This is not a prominent variety in these regions and has been mentioned only occasionally, but most of the reports concerning it are favorable. On Cecil sandy loam at 900 to 1,000 feet elevation it is inclined to rot severely, but on the more clayey soils of the Piedmont region it does well. Its season of ripening varies considerably, ranging from summer to early fall. In the middle Piedmont orchards it would probably ripen in August or early in September; at one point in North Carolina having an altitude of 3,500 to 4,000 feet, with rather loose friable loam, some very fine specimens have been seen the middle of October. In some sections of the country where early apples are grown extensively this is an important commercial sort.

Milam.

Comparatively few growers have this variety in their orchards. Its small size restricts its usefulness to the home orchard, but its high dessert quality makes it of value in this connection. It may be used in the fall, yet under favorable conditions it can be kept until well into the winter. Cecil sandy loam at 1,000 feet altitude and Porters clay at 1,500 feet appear to be favorable soil conditions for its growth in the Virginia portions of these regions.

Missouri. Synonym: *Missouri Pippin.*

This variety is found only occasionally in the younger orchards. It has not been tested sufficiently to render definite conclusions possible as to its merits for these regions. The tree is quite susceptible to twig-blight in some places. In fact, this is a rather serious weakness of the tree. Blight has been noted on trees growing on several types of soil in these regions, but it is doubtful if this is associated directly with the soil conditions. It comes into bearing at an early age, and for this reason it is frequently recommended as a "filler" to plant with other sorts with the intention of cutting it out when the permanent trees require the space.

As to the adaptability of the Missouri apple, it is sufficient to state that on Cecil clay and Porters clay at 1,000 to 1,200 feet, it is promising as a commercial sort. It has fairly good keeping qualities. At 3,000 feet in North Carolina it is doing well, but at the higher points it is of doubtful value.

Nansemond. Synonym: *Nansemond Beauty.*

This variety is quite widely distributed, but it is so very poor in dessert quality that it is not a popular apple, though it is frequently very beautiful in appearance and sometimes sells at good prices.

The finest specimens of this variety which have come within the range of these studies were grown in southern Virginia at an elevation of from 1,200 to 1,500 feet, on a soil approaching Porters sandy loam, but containing more clay than this type does, and on an eastern to southeastern slope. The trees were 16 to 18 years of age. Under these conditions it is very highly colored and of good size. Cecil clay and Cecil sandy loam at the usual elevations of these types produce fairly good specimens, but the color is usually less brilliant and the tendency to "cloud" much greater than at the higher points referred to. The tendency to drop its fruit badly is noticeable under a wide range of conditions. This difficulty has been noted especially in Virginia on Cecil clay at 1,000 feet and on Porters black loam at about 2,200 feet.

Nickajack.

In these regions this variety is commonly known by the name indicated, though more than forty synonyms for it have appeared in American pomological literature. It has been quite widely planted in these regions, especially in the Piedmont, though in small quantities. It is generally successful, being more regular in bearing than many varieties are. The fruit is similar in general appearance to McAfee, and in these regions it is doubtless preferable to that variety. In the upper portion of the Piedmont region, grown on Cecil sandy loam, Cecil clay, or Porters clay at the usual elevations of those types, it is generally prolific. The fruit may be kept until well into the winter without special care.

Northern Spy. Synonym: *Spy.*

The Northern Spy is another one of the northern varieties which is found frequently in the older orchards of these regions and is widely distributed throughout them, especially in Virginia and North Carolina, though occurring in small numbers. It has been found on nearly all the more common types of soil and at many elevations from 1,000 to 3,500 feet. While it is a standard winter variety in the North and of high dessert quality, it is of little or no value here, except possibly at the highest elevations. The claim is made that it lacks the peculiar crispness and richness of flavor in the South which characterize it in the North. The tree is a vigorous grower, and under favorable conditions it reaches large size, but it is very tardy in coming into bearing. It is frequently planted in some sections of the country as a stock on which to top-work other varieties.

Serious rotting and dropping are conspicuous faults at most southern points where this variety is grown, except at the highest altitudes. The longest keeping specimens and those which in every way approach most nearly to the best type grown in the North are produced at elevations of 3,500 to 3,800 feet in North Carolina on clay loam

soil with porous clayey subsoil. Such conditions develop a firm, solid fruit, with excellent color and fair keeping qualities. Porters black loam and some modifications of it at 2,000 feet or more in Virginia also produce good fruit, but the natural limit of its durability is reached by the Christmas holidays or early winter. So far as observed there is no exception to the general statement that at points below 1,800 or 2,000 feet elevation the variety is unsatisfactory, premature rotting and dropping occurring to a disastrous extent.

Oldenburg. Synonym: *Duchess of Oldenburg.*

As with Wealthy, Gravenstein, and several other varieties considered in this connection, but little is actually known of the behavior of this sort in these regions. So far as reported it is a regular and abundant bearer and gives promise of value as an early ripening variety for culinary purposes. Its season in the middle Piedmont would probably be early July.

Ortley. Synonym: *White Bellflower.*

Only a passing mention of this variety is required, as it is of little importance. It is in a few of the older orchards, where very little attention is given to it. Loamy soils with deep, rich, porous subsoil and comparatively high altitudes are favorable to its best development. It has a long ripening season and may be used throughout the fall months.

Pennock. Synonyms: *Pennocks, Red Pennock, Phœnix, Winter Penick, Large Romanite.*

It is seldom that this variety is found at the lower altitudes away from the mountains, but it is common in the foothills and higher elevations.

A dry rot or breaking down of the cell tissue just under the skin has been observed in certain instances, especially in the Georgia section. This variety is of only secondary importance. It does not have a reputation for heavy crops, but on Porters black loam from 2,000 to 2,500 feet elevation the fruit develops very finely and may be kept until well into the winter. The red clay loams at 1,000 to 1,200 feet also give good results where located at the foot of the mountains.

Pilot. Synonym: *Virginia Pilot.*

Like the Pennock, the Pilot is not often found, except in the mountains or in close proximity to them. It has seldom been planted in recent years. The tree requires an unusual amount of room for best results, since it grows to a large size. It is very late in coming into bearing, little fruit is produced before the trees are 12 years old, and frequently they are nearly 20 before they become a source of much profit.

This variety seldom gives satisfaction below an altitude of 1,200 feet, and then only on Porters black loam or some of the other rich, loose, mountain types of soil. On Porters clay at 1,600 feet it usually produces light crops, which frequently decay. In some places it hardly bears at all, particularly on the heavier clay soils at less than 1,000 feet elevation, where it occasionally occurs. The fruit often sets under such conditions, but it drops badly and is also liable to decay. The trees which have made the best record of any observed are in a Virginia orchard on Porters black loam with a western exposure and an elevation of not less than 1,500 feet. These trees are probably twenty years old and bear considerable fruit nearly every year. Annual bearing, however, is unusual with this variety. Some of the small growers in the mountain sections sometimes allow the fruit to remain in piles all winter under the trees, covering them with a light mulch of leaves or straw. In the spring, after the frost has gradually withdrawn before the mulch is removed, the fruit is barreled and sold. It is claimed that very satisfactory prices are often obtained when handled in this way.

Pine Stump.

But little attention has been given this variety by any of the growers. It is of North Carolina origin and has been propagated more or less by some of the nursery-

men of that State. The tree makes a fairly strong, healthy growth and is nearly an annual bearer. It does not reach a sufficiently large size to be desirable when grown in the mountains. For home use and local markets during the fall, if grown under favorable conditions, it is worthy of more consideration than it has yet received.

Pryor. Synonyms: *Pryor's Red, Big Hill.*

Many of the older orchards contain this variety, but it is more commonly known by its synonym Big Hill. It has been studied under quite varied conditions of soil and elevation, but there seems to be very little to recommend it for any portion of these regions. It is irregular and unreliable in bearing and more susceptible to diseases such as "cedar rust" and "leaf spot" than most varieties are. The fruit, when a crop is produced, is considered of pleasing dessert quality for early winter use. It is commonly said to be "played out."

Rabun.[a] Synonym: *Rabun Bald.*

This variety has not yet been disseminated outside of the locality of its origin in Rabun County, Ga., but on account of its apparent value as a winter sort of good dessert quality for the southern Piedmont and Blue Ridge regions it is referred to in the present connection. In the locality where it was first discovered, the tree is a stocky, vigorous grower, producing a heavy crop in alternate years, with considerable fruit in "off" years. The fruit is large; under color, yellow, but when well colored heavily splashed and striped with bright crimson; good to very good in dessert quality.

Ralls. Synonyms: *Rawles Genet, Geneton, Janet, Neverfail.*

Over thirty synonyms of this variety exist in American pomological literature, of which those given are the ones in common usage. There are few varieties of apples so widely distributed in as many different sections of the country as this one is, though it is seldom found in orchards of recent planting in these regions. The tree does not develop to a large size here, but is more nearly an annual bearer than most varieties are and often produces such heavy crops that the fruit is abnormally small. On account of blossoming very late it may escape injury from unseasonable frosts in the spring when most varieties are damaged thereby. It is one of the longest keeping varieties grown in these regions. It is very variable in its behavior from year to year, even on the same trees; especially is this true with reference to bitter-rot. In 1902 it was seriously affected by this disease in a large proportion of the orchards in these regions, regardless of soil or location, while in 1903 it was comparatively free from fungous diseases of all kinds, notwithstanding the fact that many varieties were more seriously attacked by bitter-rot than in the previous year.

In its wide distribution in these regions, it is found growing under nearly all combinations of conditions characteristic of them. As before noted, its difference in behavior from year to year makes reliable deductions difficult. From data at hand, however, it appears that Porters black loam and Porters clay at the higher altitudes, where so much of the finest fruit is grown, are no more favorable locations for it than Cecil clay at lower elevations. One of the most unsatisfactory impressions of the variety comes from an orchard at 1,500 or 1,600 feet elevation on Porters clay. Murrill clay loam and Cecil clay usually produce as good results as any soil conditions which exist in these regions. In the orchards of greatest elevation in North Carolina the fruit sometimes fails to develop properly, but remains green, and the texture is tough and hard. On the other hand, in 1904 some trees at these high altitudes produced a good crop of very excellent fruit. As the climatic conditions were the one variable factor, the only conclusion which seems possible is that these differences in the behavior of the variety in this instance were due to the climatic differences of the seasons.

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[a] For more complete history and description see Yearbook, Department of Agriculture, 1906, p. 359.

Rebel.

Although unimportant commercially at the present time in these regions and grown only sparingly in a few orchards, the fine appearance and good dessert quality of the Rebel apple make it worthy of more general testing than it has yet received. In season it is late fall and early winter.

In the middle Piedmont region on Cecil clay it does well and is apparently of value. It is less successful generally when grown on the red clay loams as far north as Rappahannock County, Va., than it is farther south. At some points in the Shenandoah Valley (which is, of course, outside the limits of the regions in question) the fruit as a rule is rather undersized.

Red Astrachan.

The Red Astrachan is not important in these regions at the present time, but in some sections where early apple growing is a commercial industry it is one of the most profitable varieties grown. It is known to possess a wide range of adaptability in many different sections of the country, and from available data at hand it seems probable that it may be of value in large portions of these regions for its season, which in most of the Piedmont region is during July. Possibly it would begin to ripen at extreme southern points late in June. The range of conditions, however, from which actual data have been obtained have been rather limited. The tree as a rule makes a strong growth. It is late in coming into bearing, often being 10 to 12 years old before it bears heavily.

At 1,000 to 1,300 feet elevation on Cecil sandy loam and on Cecil clay in Virginia satisfactory results are claimed. Similar favorable reports are given in the South Carolina section of the Piedmont, where this variety is more or less grown. It has seldom been found at the higher altitudes; hence, its behavior in the more elevated places and under the soil conditions of the mountains can not be definitely stated. At one point in North Carolina on soil similar to Cecil sandy loam, at about 2,000 feet elevation, it is said to develop a slightly bitter taste, which makes it unpopular, but aside from this it is said to do well under these conditions.

Red June. Synonyms: *Carolina Red June, North Carolina Red June, June.*

The distribution of this variety in the Piedmont region is quite wide, though the individual plantings are small. It is one of the earliest ripening varieties grown in the region, and is considered of value for its season. In general, the comments relative to Red Astrachan are applicable to this variety also. At points in the extreme southern portion of these regions it is grown more commonly than the Red Astrachan is. On the sandy loam of Lumpkin County, Ga., with an elevation of 1,500 feet, it is said to do especially well.

Rhode Island Greening. Synonym: *Greening.*

As might naturally be expected, this variety is of but little value here under any of the existing conditions. It follows closely the behavior of most northern varieties when grown at southern points. Fortunately, it is in only a few orchards. The most satisfactory location observed is in western North Carolina, at an elevation of 3,000 feet, on a deep porous loam. Under most conditions in these regions where it has been found, early maturity, premature dropping, and decaying are common faults. In most southern locations, except at high altitudes, it lacks nearly all the points of merit which in the northern fruit-growing regions make it one of the standard commercial winter sorts.

Rome Beauty. Synonym: *Gillett's Seedling.*

Although this is a well-known variety and one widely distributed, it is rarely found in the regions in question. As a rule, wherever it has been planted it is growing under some other name, and only a tree or two of it in a place. Most of the trees in this region are young; hence, the variety has not been tested for a sufficient length of time to definitely determine its merits. It appears, however, to be promising for

this section, especially in the Blue Ridge region, and to be worthy of attention by those who are planting orchards or even small collections for home use.

In Virginia, on Cecil sandy loam, at 900 feet, it is especially satisfactory, particularly in view of the fact that these conditions are unfavorable to most varieties. So grown, it is said to keep until the holidays. Cecil clay and Porters clay at elevations of 1,000 to 1,500 feet, in the northern Piedmont and Blue Ridge regions, usually combine conditions which are favorable to this variety. At 1,500 feet altitude on Porters clay it becomes an early winter variety of very fine appearance and good dessert quality. As a rule, it is considered especially well adapted to sandy soil. On Porters black loam at 2,300 feet, it is considered of more than usual value. It is highly prized in western North Carolina, where it occurs at an altitude of 3,000 feet on a deep porous mountain loam. It is, however, somewhat inclined to drop. This is its greatest weakness, but with good cultural conditions it appears worthy of more general planting in the future.

Roxbury. Synonym: *Roxbury Russet.*

While grown considerably in the northern fruit districts, the Roxbury is an unimportant sort in the South and is in only the older orchards. It produces fairly abundant crops in the mountain orchards, and the fruit usually reaches a comparatively high degree of perfection for the variety, but it lacks the long-keeping qualities for which it is especially valued in the North.

Shockley.

This is another one of the widely distributed varieties of the older plantings. It possesses many characteristics of merit in nearly the entire Piedmont region from Virginia to Georgia. Its small size makes it undesirable for commercial purposes, and its poor dessert quality renders it unfit for a high-class dessert apple, but its abundant and regular bearing proclivities under most Piedmont conditions and its unusually good keeping qualities make it worthy of some consideration, even though it is lacking in some other particulars. Doubtless the conditions under which it grows influence its flavor to a noticeable degree. The claim has been made in one comparison that on Porters black loam with northern exposure it is small and of very poor flavor, while at the same elevation on a red clay soil with southern exposure it is of good size for the variety and its flavor greatly improved over that on Porters black loam. In some instances the fruit has been severely attacked by apple scab and cedar rust, especially the latter. This susceptibility to disease does not appear to be influenced by location.

At 1,500 feet altitude in Albemarle County, Va., on Porters clay, this variety is not considered of special value, but at the same elevation in Georgia on a soil containing rather more sand than Porters clay does, with good culture it comes to a high degree of perfection, and when held until midwinter it generally brings very satisfactory prices in local markets. In the southwestern part of North Carolina, at 1,700 feet elevation, on a friable, porous loam, with good culture it bears annual crops of highly colored fruits, which develop to a larger size than under most conditions. In North Carolina at 3,500 to 3,800 feet, while the Shockley apple bears heavily and colors well, it is usually too small to be of much value, especially as other more desirable sorts succeed at these elevations. The clay and clay loam soils of the Piedmont region with the usual elevations of those soils may be expected, as a rule, to produce this variety in a fair degree of perfection.

Smith Cider.

In a number of orchards at widely separated points in these regions, the Smith Cider apple is grown more or less. While it does not rank high as a commercial sort it has frequently been a profitable variety. The fruit is more subject to bitter-rot than many sorts are, but this disease has not been very serious as a rule. Its season is late fall or early winter, depending upon the conditions under which it is grown.

On the Cecil clay and Porters clay soils of the Piedmont region of Virginia this variety usually reaches good size, colors well, and develops a higher dessert quality than it does in many sections of the country. It also does well in the mountains up to an elevation of 1,500 feet. It has been found in only one or two orchards at higher elevations, but at these points it is of no special value, since it appears to lack the characteristics which make it desirable at the lower levels. At an altitude of 3,000 feet on loose mountain soil in North Carolina it is said to bear irregularly, to be of soft texture, and to possess poor keeping qualities. In the northern portion of the Piedmont region when grown on the friable red clay loam at about 1,500 feet altitude it is especially mentioned for its productiveness and is said to be a profitable market variety.

Smokehouse.

A large number of orchards contain this variety in both the Piedmont and Blue Ridge regions, although it seldom occurs in their southern portion. It is valued both for market and for the home orchard. Fairly heavy crops are borne in alternate years, with very light crops as a rule in "off" years. In the central Piedmont sections it is a fall apple.

That it may be successfully grown under a wide range of conditions is made evident by the universally favorable reports made by growers whether located on the clayey soils of the Piedmont or the more porous types of high mountain sites.

Stayman Winesap.

The plantings of this variety have been very limited and of too recent date to draw any definite conclusions as to its ultimate value for these regions. It is generally considered one of the more promising of the newer sorts. In North Carolina at 3,000 feet elevation it is considered of special value, and at one point extensive plantings of it have been made. While in some seasons it does not color as highly as is desirable, this defect apparently occurs less frequently as the trees get older. At an elevation of 3,500 to 3,800 feet in North Carolina on loose mountain loam young trees have produced exceptionally fine specimens. So far as observed it is also promising under Piedmont conditions.

Summer Rambo.

There has been a lack of systematic study of this variety, as of all the earlier ripening sorts. It is a common variety in some sections of the Piedmont regions and gives general satisfaction for its season. It is not much grown in the mountains.

Terry.[a] Synonym: *Terry Winter.*

The dissemination of the Terry apple has been somewhat general through the extreme South, but in very limited numbers. The tree is a slender, upright grower and very productive, the fruit inclined to be undersized on this account. Nearly annual crops are produced. It is one of the few late-keeping, well-colored winter sorts of high dessert quality which are especially adapted to southern conditions.

The only orchard in these regions in which trees of this variety have been located is in Habersham County, northeastern Georgia. At this point the elevation is about 1,400 feet and the soil a reddish, rather sandy loam characteristic of this region. Under these conditions, with good culture it is proving of exceptional merit as a winter sort. The many points of merit which it possesses make it one of the most promising varieties for the southern portions of these regions.

Tompkins King. Synonyms: *King, King of Tompkins County.*

It is sufficient to note concerning this variety that it follows in general the behavior of the other northern varieties which have been planted in the South. It is not much grown, however, in these regions. The tree is short lived here, as in the North.

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[a] For a more complete history and description, see Yearbook, Department of Agriculture, 1903, p. 270.

In the upper portion of the Blue Ridge region at an elevation of 1,500 feet on Porters clay it matures early in the fall, possessing no particular points of merit. In some of the orchards of greatest elevation in the Blue Ridge it more nearly reaches the characteristics of northern grown specimens, but it can not be recommended even for these locations.

Virginia Beauty.[a]

The history of this variety dates back nearly a century to its origin in Carroll County, Va. Though more or less disseminated in that section of the State soon after the original tree began to bear, it does not appear to have become generally known, unless possibly in a few particular sections, until comparatively recent years. This variety has been planted quite extensively in some sections of these regions during the past few years. The tree is a sturdy, stocky grower with branches standing out nearly straight from the main axis of the tree, producing a rather flat head. In a few instances it has blighted somewhat, but this has not been a common experience. The fruit is large; when highly colored nearly a solid purplish red; flavor mild, subacid, almost sweet, and of excellent dessert quality. Its season is fall to midwinter, as influenced by the conditions under which it is grown and kept. It is fairly productive, though possibly not bearing such heavy crops as some sorts.

This variety has been noted as giving very pleasing results on Cecil clay and Cecil sandy loam at 800 to 1,200 feet elevation, and at the higher elevations in western North Carolina it is also doing well. The influence of elevation does not appear to be as marked as in the case of many other varieties which have been mentioned.

Wealthy.

This variety is rarely found in these regions and the trees are of too recent planting for it to be fully tested yet. From the indications, however, it appears to be a promising variety for its season. Its behavior in other widely separated sections indicates that it is well adapted to an extensive range of conditions. It is attractive in appearance, of good dessert quality, suitable for either home use or market, ripening in the central Piedmont region of Virginia during August.

Willow. Synonym: *Willow Twig.*

The limited range of conditions under which this variety has been studied renders a definite estimate of value impossible. It has been located in a small number of orchards, of which the following represent typical conditions.

At one point in Bedford County, Va., on what is probably Porters sandy loam with east to southeast exposure and 1,200 to 1,500 feet elevation, this is considered one of the most satisfactory varieties. It also does well on the porous mountain soil of North Carolina at 3,600 to 3,800 feet altitude.

Winesap.

This is one of the four or five great commercial varieties of the Piedmont region, and as a "general-purpose" winter apple for the Piedmont conditions it is one of the most uniformly successful and satisfactory sorts grown in this region. What the Baldwin is to the northern apple-growing sections, this variety is to this region. In habit of growth the tree is somewhat drooping and irregular, but it is fairly strong and vigorous, though occasionally severely attacked by some of the leaf-blight fungi. The root system is inclined to be rather weak and shallow; hence the trees are more liable to be uprooted during storms than they otherwise would be, but in orchards that are fairly well protected this has not proved an especially serious matter. The trees often begin bearing when they are 3 or 4 years old and usually produce paying crops when 6 to 8 years old. While not producing heavy crops every year, they are more nearly annual than those of most varieties, especially when the trees are maintained under good cultural conditions.

[a] For a more complete history and description, see Yearbook, Department of Agriculture, 1905, p. 495.

Reference to its behavior under stated conditions will indicate in some degree the range of adaptability of the Winesap in these regions. At 800 to 1,000 feet altitude on Cecil sandy loam in the upper Piedmont the tendency to rot and drop is more marked than on Cecil clay at the same altitudes. This is, however, one of the most satisfactory winter varieties on Cecil sandy loam at the usual altitudes of this soil. Cecil clay and Porters clay at elevations of 1,000 to 1,200 feet furnish combinations of conditions which appear to be quite ideal for producing this variety with marked success. As a rule, orchards thus located may be expected to be more regular in bearing and to produce finer, more highly colored fruit than under most other conditions afforded in these regions. On Porters black loam and the other loose mountain soils at elevations exceeding 1,200 to 1,500 feet it is susceptible to the apple scab fungus, and increasingly so at higher altitudes. At the higher elevations it is also usually small and poorly flavored and frequently possesses a faded, "washed-out" color which appears to be peculiar to such conditions, with a tendency to stripe instead of developing a solid red color. These tendencies have been noted in a lesser degree in some of the "cove orchards" at elevations of less than 1,200 feet, where Porters black loam abounds, but they are much less pronounced and occur with less uniformity than at the higher points. On the other hand, extended observation indicates that these characteristics tend to disappear on red clay soils until elevations of at least 1,500 feet are reached, and possibly even higher altitudes. The effect of the higher elevations, as above noted, appears to diminish to a large extent in the rather loose clayey loam of the Blue Ridge region in western North Carolina. The soil in question is intermediate in physical characters between Cecil clay of the lower levels and Porters black loam. With these soil conditions at elevations of from 2,500 to 2,800 feet, the Winesap is considered one of the standard commercial winter varieties. It is said, however, to bear more abundantly on the heavier clay soil which is found in small areas in this mountain section than on the more loamy types. The conditions in the northern portion of the Piedmont region seem to be less uniformly favorable to its highest development than in most of this region, the fruit developing some of the characteristics of that grown at the higher elevations farther south. In connection with the behavior of this variety in these regions it is of interest to note that the peculiarities which it develops in the northern portion of the Piedmont region and at high elevations farther south in the Blue Ridge are similar to those manifested in the northern apple-growing districts, but in the North they are still more pronounced than they are at any point in the South.

Summarizing these results, it is apparent that the conditions in the northern portion of the Piedmont region at 1,000 to 1,200 feet elevation do not produce the best results, and that in the more southern counties of Virginia which have been referred to the conditions produce very excellent fruit, but less satisfactory results are secured at points having elevations which much exceed that of the Piedmont region, while still farther south this variety can be grown at higher altitudes than is possible in the northern portion of the Piedmont. Its behavior thus indicates in an interesting way the corresponding relationship between altitude and latitude in their influence upon the behavior of this variety.

Winter Paradise. Synonym: *Paradise Winter Sweet.*

There are few sweet apples grown in these regions, and of the number this is the most common one, especially in the older orchards of the Piedmont section of Virginia. It is not being planted much at the present time. Its season is fall and early winter. By careful handling it can be kept until the Christmas holidays. As a local market variety it is fairly popular, usually bringing as high prices as any variety of its season, and frequently more than most sorts. The fruit is more or less subject to bitter-rot, the loss from it sometimes representing a large part of the crop.

From observations made thus far it is apparent that the best results may be expected on Porters clay at elevations of 1,200 to 1,500 feet in the middle sections of these regions or in corresponding locations north and south. Wherever it has been found at the higher altitudes in Virginia on the loose mountain soils, the fruit has usually been rather small in size and of poorer dessert quality than at the lower points.

Yates. Synonyms: *Yates Winter, Red Warrior.*

The Yates is a variety widely distributed over much of the Piedmont region, though seldom grown in commercial quantities except for small local markets. The tree makes a healthy, thrifty growth, bearing regular and heavy crops. The fruit is small in size, rather unattractive in appearance, and not of high dessert quality, but even when grown in the extreme southern portion of these regions it has long-keeping qualities, frequently being kept until spring with no special care, and then, when there is little competition with other varieties, it is sold in local markets at very profitable prices. For general market purposes, however, its small size makes it undesirable.

In the course of these studies this variety has been found doing especially well on Cecil sandy loam in Bedford County, Va., at about 1,000 feet elevation and in northeast Georgia under the conditions mentioned under Terry. Its productiveness and long-keeping qualities in these sections make it considerably prized.

Yellow Bellflower. Synonym: *Bellflower.*

This variety has been found in several orchards under quite widely different conditions in the Virginia section of these regions, including both lowland and mountain locations. There is nothing to recommend it in any of these situations so far as observed. As a rule it is unproductive, and the fruit which reaches maturity is relatively small and inferior in nearly every particular.

Yellow Newtown. Synonyms: *Albemarle Pippin, Newtown Pippin, New York Pippin, Virginia Pippin.*

In these regions the synonym first mentioned is the name by which this variety is universally known, though the leading varietal name, according to the rules of the American Pomological Society, is as indicated. It is one of the few prominent commercial varieties of these regions, Winesap, York Imperial, and Ben Davis being the others of most importance. It is grown to some extent the entire length of the Blue Ridge region, but more extensively in Virginia and North Carolina than at points farther south. While it ranks as one of the leading commercial sorts of these regions and doubtless bears a more flattering reputation than any other one, there are comparatively few growers who consider it as profitable as some of the other varieties, and it is being planted extensively at present only in a few rather restricted sections. The greatest possibilities of the variety can be realized only when it is grown under the best cultural conditions. As better methods of orchard management are adopted in these regions, it is possible that it will increase in commercial importance in the future for planting in locations to which it is especially adapted, because of the high favor in which the fruit is regarded both for export and domestic markets and the relatively high prices which it generally brings.

The tree makes a slow growth and under usual methods of culture in these regions is late in coming into bearing. It seldom produces crops that are of commercial value before it is 12 years old, and in the experience of many growers not until it is 18 or 20 years old. It is unusual for the trees to bear any fruit of commercial consequence more frequently than every other year, and many orchards do not produce crops oftener than every three or four years, and even less often in numerous cases. The orchards which are given the best cultivation are as a rule the ones which bear the most regularly and abundantly and are relatively the most profitable. The tree is quite subject to twig-blight in comparison with many other varieties, and bitter-rot

attacks the fruit very seriously in some cases. The latter, however, yields readily to spraying, and hence is regarded with less concern than formerly.

The wide distribution of this variety has made possible a more extensive study of its range of adaptability in these regions than of many other sorts. The results of these observations are summarized as follows:

Successful culture of this variety is commonly supposed to be confined to the black soil (Porters black loam), or "pippin soil" as it is often called, of the mountain sections of the States included in this discussion. While this may be true in a general way, it is evident that there are several types of soil on which it is reasonably successful. All the types, however, possess at least two characteristics in common, namely, a high degree of fertility and a comparatively loose, friable texture. The subsoil must also be comparatively open and porous and the location such that perfect atmospheric and soil drainage are insured. All things considered, as above indicated, Porters black loam doubtless is one of the most satisfactory types of soil for this variety, since it usually possesses the qualifications mentioned above in the highest degree. This apple is found principally in the mountains at various altitudes and in coves where Porters black loam abounds, often at elevations not exceeding the general level of the Piedmont. Even these lower points, where the drainage is good, are favorable places for this variety, though the higher altitudes are to be preferred. Most excellent fruit is grown also on Porters sandy loam, and so far as the data at hand indicate the orchards on this type are equally as productive as those on Porters black loam, although it should be stated that Porters sandy loam varies greatly in fertility, and this fact should be considered in selecting sites for orchard purposes.

One type of red clay soil on which this variety succeeds well appears at first sight to be a stiff, compact clay, but in reality it is friable and fairly porous, so that in this particular, as in the other points, it conforms to the requirements mentioned. This type is found in some parts of Nelson County, Va., and is considered especially desirable for this variety. It is probably a modification of Cecil clay, but possesses a friability and looseness of texture which this type does not have. The most desirable locations in the last-named county are on the slopes of the mountains and hills with elevations of 1,000 to 1,500 feet or more. This type of soil is also found more or less in other sections. The red loam of northeastern Georgia is somewhat similar, but it contains less clay, possesses a more friable texture, and the subsoil is more porous. In the latter section only young trees of Yellow Newtown have been observed. These have borne a medium-sized crop of fairly high-grade fruit, but premature dropping was indicated. The trees, however, were in a neglected condition.

In Rappahannock County, Va., one type of soil on which the Yellow Newtown is commonly grown is also quite like the Nelson County type. The behavior of the variety in this section does not differ materially from that farther south, but it is considered less profitable than some other kinds, especially York Imperial, and it is seldom found in other than the older orchards.

In the Piedmont types of soil throughout the regions of which Cecil clay and Cecil sandy loam are the most common, this variety is nearly a complete failure. The relatively poor atmospheric drainage of the region and the close texture of the soil probably account for the lack of success on Cecil clay, while Cecil sandy loam is lacking also in fertility. Under these strictly Piedmont conditions the fruit is usually small, unattractive in appearance, frequently drops prematurely, is subject to disease, especially to the fungi causing "cloudy" fruit, is of relatively inferior dessert quality, and is lacking in nearly every other desirable characteristic. In many instances the trees on the heavier, more compact soils are less vigorous and the foliage lighter colored than on soils better adapted to them. In the mountain orchards in North Carolina having the highest elevations this apple is less satisfactory than at intermediate points.

Yellow Transparent.

During the past few years this variety has become quite widely distributed in the Piedmont region, but it has seldom been planted in the mountains. The individual plantings consist of only a few trees each. The tree is not as a rule a strong grower, nor is it considered a long-lived tree in other sections where it has been grown extensively, although aside from its susceptibility to twig-blight, which in some cases is severe, it is not subject to any special disease. As a rule, however, in these regions blight has not been a serious matter. On account of the rather small size attained by the tree, closer planting is possible than in the case of most other sorts. Few varieties begin to bear as young as this one does. Fairly regular and abundant crops may be expected under good cultural conditions. Its season of ripening is in advance of Early Harvest, which is the early variety most often found in the older orchards.

Observations in these regions have been confined to comparatively young trees, but thus far as an early ripening sort the Yellow Transparent is giving a high degree of satisfaction wherever it has been tried. This applies to nearly the entire range of conditions existing in the Piedmont region and to at least one of the most elevated localities in western North Carolina.

York Imperial. Synonym: *Johnson's Fine Winter.*

The distribution of this variety has been quite general in the Virginia and North Carolina sections of these regions, where it rates as one of the most important market sorts. The tree is desirable as to habit of growth, being fairly vigorous and healthy aside from its susceptibility to "twig blight," which occasionally is rather severe. It begins bearing comparatively young, frequently producing crops of considerable value at 6 or 7 years of age.

The data at hand are somewhat conflicting concerning the relationship between the behavior of this variety and the conditions under which it is grown; hence only generalizations can be indicated at present. It appears to be less influenced by soil conditions than by elevation. In the Piedmont orchards having less than 1,000 to 1,200 feet elevation serious rotting and premature dropping are apt to occur, and while frequent exceptions to this have been observed it is sufficiently constant to suggest that extensive plantings of it in this region should be made cautiously, if at all, except in the northern portion, where it appears to be more nearly free from serious faults than almost any other commercial variety that is being grown and is considered one of the most profitable sorts. This applies specifically to locations in Rappahannock County in close proximity to the mountains. In the Blue Ridge region above an elevation of 1,200 to 1,500 feet premature dropping is generally less severe than it is at lower points. Especially satisfactory results have usually been obtained on Porters clay at these middle elevations, where very heavy crops are expected, at least in alternate years. If heavy dropping occurs in such cases, a sufficient quantity of fruit usually remains to result in a heavy crop. At the higher altitudes this is considered a valuable variety, especially in North Carolina, where it has grown at 2,500 to 3,500 feet altitude.

It is frequently found advisable to harvest the crop of this variety somewhat earlier than that of most of the other commercial sorts on account of its tendency to drop, but this is not necessarily an objection in large orchards, where the harvesting must extend over a considerable period of time.

The contrast between this variety and Winesap in the manner in which they respond to the influence of elevation is of interest. The elevation at which the Winesap begins to deteriorate and above which it becomes more inferior as the elevation increases appears to be about the point below which York Imperial is inclined to manifest certain faults which tend to disappear at higher altitudes.

PEARS.

Pear culture is not a commercial industry in any portion of the Piedmont or Blue Ridge regions. There are a few orchards of considerable size at widely separated points, but the aggregate of the fruit produced is relatively small and of little consequence considered from the standpoint of supplying any extensive market demands. Only a small number of the more common varieties are being cultivated. Brief mention of the most important ones follows.

VARIETIES.

Angouleme. Synonym: *Duchesse de Angouleme.*

Trees 10 or 12 years old of this variety are giving promising results in Bedford County, Va., where they are growing on Porters clay at 1,500 feet elevation. Harvesting usually occurs from the first to the middle of September.

Bartlett.

This variety occurs occasionally in the Piedmont region of Virginia, but only very rarely in any other section of the territory under consideration. It has been observed at but one point in the Blue Ridge. The chief difficulty with this variety is the susceptibility of the tree to blight. This disease is frequently very severe at the points where the variety has been observed. The fruit grown in these regions ripens from the middle of August to the middle of September, as influenced primarily by the elevation at which it is produced.

Excellent fruit is grown where the trees remain in good condition in the Piedmont region of Virginia. It has been located in one mountain orchard in North Carolina at an elevation of 3,500 feet or more on a friable loam, where it is evidently fairly satisfactory. The only other point in the latter State from which this variety has been reported is in the Piedmont region with an elevation of about 1,100 feet. Here the blight has been so severe that the variety has been practically discarded.

Clapp Favorite.

Notes relating to Angouleme apply also to this variety, except that it is earlier and the tree is very subject to blight.

Garber.

This variety has been observed only on Cecil sandy loam at about 1,000 feet altitude in Virginia. It appears to be well adapted to these conditions, producing excellent crops of fruit for the variety. Harvesting occurs from the middle of September to early October. The tree apparently is not particularly subject to blight.

Kieffer.

There are but a small number of large commercial plantings of this variety, but it is generally distributed in small lots throughout the Piedmont region. However, it is the only variety in these regions that is grown to any extent for market purposes. It has not been commonly planted in the mountains. The tree grows well and bears abundantly on all the Piedmont soils; the fruit develops satisfactorily, and where well cared for and properly handled it develops a higher dessert quality than it does under many conditions, especially at northern latitudes. This applies especially to points in the southern portion of the Piedmont. The orchards in North Carolina having altitudes of 3,500 feet or more are evidently above the range of its satisfactory development. While the trees make a good growth at these elevations and bear heavy crops, the fruit assumes the characteristics of northern-grown specimens. The texture of the fruit at these high points is hard and woody, the color less attractive,

the flavor poorer, and the size smaller than when grown under the Piedmont conditions. The last of September to early October is the harvest period, the exact time being governed by the conditions under which it is grown.

Le Conte.

Conditions which are favorable for the Kieffer and the Garber have generally proved well suited to this variety. It is also growing on the deep red loam of northeastern Georgia at an altitude of 1,500 to 1,700 feet. The fruit develops well here, but the trees have sometimes blighted considerably, though apparently no more subject to blight than under other conditions of soil and elevation. Sometimes at the more southern points harvesting is begun the last of July, but usually August to early September covers the period.

Seckel.

A small number of fruit growers in the northern portion of the Piedmont have mentioned this variety, but its distribution in this region is very limited. It is said to give good results on Cecil sandy loam and on the lower mountain slopes where the soil approaches Porters sandy loam in texture. It has been reported favorably from western North Carolina at 3,500 to 3,800 feet elevation; also at 1,100 feet it is said to give satisfactory results. In the Virginia portion of the Piedmont region it is usually picked the last of August to the middle of September. The tree appears to be less subject to blight than many varieties are.

PEACHES.

Of the orchard fruits which are being grown in the Piedmont and Blue Ridge regions, the peach is next to the apple in commercial importance, though in comparison with the latter the industry is small except in a few localities. There is but a small number of orchards at high elevations, the most of them being at the Piedmont altitudes or along the foothills and lower slopes of the mountain sides.

The commercial development of the peach industry has been more or less centralized in certain localities. While individual orchards are scattered throughout the regions in question, the aggregate product of which is considerable, they have no appreciable influence upon the general market, since their output is practically all required to supply the local demand. Of the more important commercial centers, Albemarle County, Va., has become somewhat conspicuous during the past fifteen years or so, because of the late peaches which are produced along the lower slopes of the Blue Ridge. There are also orchards of commercial importance in Amherst and Bedford counties, as well as at other points in this State, but they are considerably isolated in their location with reference to one another and, as above stated, supply, mostly, only local needs. The same thing is true in the corresponding sections of North Carolina and South Carolina.

Northern Georgia is relatively the most important portion of these regions as a peach-growing section. The orchards are still young, but many of them are extensive, and the product of the region is a recognized factor in the peach market.

The varieties that are commonly grown have not been studied in relation to their adaptability to the conditions as critically as is desirable, since personal inspection during the ripening period has been impracticable in most cases, and hence the verification of the identity of but few of the varieties has been possible. The notes relating to the behavior of the several varieties referred to are based on the experience and opinions of the growers, not on personal observation, except in a few instances.

Some reference is made under nearly every variety to its time of ripening in some particular section. While the dates mentioned indicate as nearly as possible average periods of ripening, attention should be called to the fact that there is frequently considerable difference from year to year. Hence, the dates given should be interpreted as coming within the probable range of the ripening period, the exact date being subject to the influence of varying climatic and other conditions.

VARIETIES.

Albright. Synonym: *Albright's Winter.*

This variety is grown in these regions only to a very limited extent and occurs at but a few points. Its late season of ripening is the one point which calls for special mention. In some seasons it is marketed as late as November from here. It seems to be quite susceptible to injury from low degrees of temperature while in bud, but the blossoms are said to endure cold to an unusual degree.

At 1,000 to 1,500 feet elevation on Porters sand on the lower slopes of the Blue Ridge and its spurs, the Albright is somewhat prized by some of the growers, particularly in Albemarle County, Va., where very profitable returns in some seasons are reported. It also does fairly well at 1,000 feet elevation in the Piedmont region of South Carolina, but the fruit is more susceptible to disease, especially scab or brown-spot, than on the slopes of the mountains. Its season of ripening is probably too late to permit of its reaching perfect maturity on the heavier clay soils of a large portion of the Piedmont region. When the fruit fails to mature in these regions because of the relative shortness of the season, it does not attain a desirable size as a rule and a great amount of fuzz develops on the skin, making it very unattractive in appearance.

Alexander.

Many orchards and small plantations in widely separated sections of these regions contain a small number of trees of this variety. Its principal value is its earliness. However, it is not of great importance commercially here, unless it be for the small grower who supplies a local market. In these regions it is essentially a June peach. At some of the earliest points picking begins the last of May, sometimes as early as the 18th or 20th, extending to early July in the more northern locations or at the higher elevations south, as, for instance, in Buncombe County, N. C., at 2,800 feet altitude.

The behavior of the Alexander peach under these conditions is suggested by the following: On the lighter soils, such as Cecil sandy loam or Porters sand of the northern portion of the Piedmont region, it does fairly well, but is not especially prized. It has also been reported on Cecil clay, which appears to be a reasonably satisfactory type on which to grow it in these regions in most instances. The decay of the fruit and its irregular ripening, one side maturing before the other, are common faults. The same characteristics are also developed in western North Carolina at 2,000 feet

elevation on sandy loam. The conditions which appear to have given the most uniform success are Porters black loam at about 2,000 feet altitude in Amherst County, Va. Here the fruit is usually but little inclined to decay.

Amsden. Synonym: *Amsden's June.*

Occasionally this variety is found in both the Piedmont and Blue Ridge orchards, but it is relatively unimportant. Like many early varieties, it is likely to rot very badly except under the most favorable conditions. It manifests this tendency to decay in western North Carolina even at 2,000 feet elevation on soil similar to Cecil sandy loam, but under these same conditions it is said to withstand relatively low degrees of temperature in bud and set fruit at times when most other varieties are killed. In Amherst County, Va., on Porters black loam at 2,000 to 2,500 feet altitude, it is said to be usually very fine. It rotted at this point during the season of 1903 for the first time, due probably to the unfavorable climatic conditions which prevailed. In the central Piedmont sections maturity is reached about the middle of June.

Arkansas Traveler.

This variety has been referred to by only one grower, who is located in Albemarle County, Va. On Porters sand at 1,000 to 1,100 feet altitude with south to southeast exposure it is considered one of the most desirable of the early sorts, ripening here the last of June. Under these conditions it does better than on Cecil clay at 1,000 feet elevation; it also develops a better color on the lighter soil. This comparison is made by the one grower who has it under the two sets of conditions mentioned, the locations being in close proximity to each other.

Beatrice.

On Cecil sandy loam at 1,000 feet altitude in Bedford County, Va., this variety does not prove to be of any particular value. The fruit ripens on one side and becomes soft before the other side is ripe. As reported from western North Carolina on similar soil at 2,000 feet altitude it is considered a standard variety. As implied elsewhere, such conflicting results as the above should receive further investigation, particularly with regard to the identity of the variety in the different locations mentioned.

Belle. Synonym: *Belle of Georgia.*

Reference to this variety has been made by growers in only the southern portion of the Piedmont region, where in the deep red loams or clay loams it is recognized as one of the leading varieties. Its season in northern Georgia is early July to the middle of the month.

Bilyeu. Synonyms: *Comet, Bilyeu's Comet, Bilyeu's October, Bilyeu's Late.*

In Albemarle County, Va., where peach culture has been developed to a considerable extent, this is the most important variety being grown. It is the latest sort to ripen of those which are being extensively cultivated, coming into the market the last of September and frequently extending nearly to the end of October, when the supply of peaches is light. At this season, good prices usually prevail and it is considered a profitable sort. At the present time it is grown but little in the Piedmont and mountain regions, except in the county named and in a few orchards in Amherst County, Va.

The Bilyeu is more sensitive to the influence of conditions under which it grows than most varieties are. The highest degree of perfection in these regions is reached on the lower slopes of the mountains, somewhat elevated above the general level of the Piedmont, where perfect atmospheric and soil drainage are insured. Excellent results are obtained on Porters sand where properly located, but Porters black loam and nearly all the loose, friable mountain types of soil are well suited to it. On Tobacco Row Mountain in Amherst County, Porters black loam, with an elevation of 2,000 to 2,500 feet, it develops very finely, and is considered one of the most satisfactory of all the varieties grown in this section. Under these conditions the fruit develops to a large size and colors very beautifully. On the heavier clay soils the behavior is entirely

different. The fruit is subject to several fungous diseases and does not develop properly, being small and inferior in every way to that from the higher altitudes.

In western North Carolina on soil similar to Cecil sandy loam, with 2,000 feet elevation, very pleasing results are also reported. But at the lower levels toward the southern extremity of the Piedmont region, the experience of the growers is similar to that of the growers in the upper Piedmont and indicates that this variety is not well adapted to this section. The fruit does not develop to a satisfactory size and in appearance is similar to that grown farther north on the heavier soils at similar distances from the mountains.

Bishop. Synonym: *Bishop's Early.*

The only location from which this variety has been reported is in Bedford County, Va., on a red clay soil similar to, if not identical with, Porters clay, at an elevation of about 1,200 feet. It is claimed to be satisfactory. The good reputation which it has made at corresponding elevations in the Allegheny Mountains on a red shale soil, together with its behavior as above mentioned, indicates a considerable range in its adaptability to soil conditions. In the central Piedmont region ripening would probably occur from the middle to the last of July.

Carman.

This is one of the more recent introductions which is promising in many locations. In the friable red clay loam and sandy loam of northeastern Georgia and western South Carolina, with elevations ranging from 1,000 to 1,700 feet, this is considered one of the most important varieties. In Albemarle County, Va., under conditions favorable to Bilyeu, it is very fine, but in this same locality on Cecil clay at 900 feet elevation it is said to rot badly and to advance rapidly from a condition which is too immature for picking to one which is too soft for shipping. In the above-mentioned county, at 900 feet elevation, its season extends from July 15 to July 25. In central Georgia it is nearly a month earlier.

Champion.

Only a small number of growers in these regions have had experience with this variety, but two having mentioned it. These have trees located on Porters sand at about 1,200 feet elevation in Albemarle County, Va., and Cecil sandy loam at 1,000 feet in Bedford County. In each case the results indicate that the Champion has considerable merit for these conditions. It is reported to endure severe climatic conditions in a sufficient degree to produce good crops of fruit when most other varieties have failed to do so under the same conditions. In the central Piedmont sections ripening would probably occur from the last of July to early August.

Chinese Cling.

The distribution of the Chinese Cling is more general than most varieties. As a rule it is proving fairly well adapted to the conditions prevailing in the Piedmont region and on the lower slopes of the mountains. In Albemarle County, Va., however, the difference in its behavior on the lowland and on the mountain slopes is as marked as with Carman. In the former location this variety is said to decay seriously, while on the mountain slopes only a short distance from the Piedmont orchard in which serious decaying occurs it is giving good results and is considered a standard sort. Cecil sandy loam at 1,000 feet altitude, a similar type at 2,000 feet in North Carolina, and a friable red clay loam in northeast Georgia having about 1,500 feet elevation are other combinations of conditions to which it seems well adapted. On a clay loam at 1,000 feet elevation in South Carolina, it is inclined to decay badly. In the Piedmont region ripening occurs from the last of July to the middle of August, the exact time depending upon elevation and other conditions.

Connett. Synonyms: *Southern Early, Connett's Southern Early.*

Few of the growers have had experience with this variety. It has been reported, however, as doing exceptionally well under three diverse combinations of conditions.

Two of these locations are in Virginia, one of which is in Amherst County on Porters black loam at 2,000 feet altitude, the other in Bedford County on Porters clay at 1,200 to 1,300 feet. The third is in South Carolina at 1,000 feet altitude, on a soil similar to Cecil clay, but which contains more sand than this type does. A wide range of adaptability is thus indicated. In the latter location its season is early July, but later farther north or at greater elevations.

Crosby.

Occasionally this variety has been mentioned in Virginia, and usually with commendation. In Albemarle County on Porters clay grading into Porters sand, at 1,100 to 1,200 feet elevation, the Crosby bears abundantly and the fruit develops to a good size for the variety, but at 1,500 feet or more the fruit is frequently too small and the skin covered with a fuzz too dense to be desirable. Cecil clay at 1,000 feet in Bedford County also appears to be well suited to this variety. Ripening occurs the last of August in the middle Piedmont sections. The buds are considered very hardy with reference to low temperatures.

Early Crawford.

This has long been a standard variety of wide distribution and it does fairly well in the Piedmont region wherever it has been grown. At high elevations in North Carolina it is said to be rather tender in bud, but when it escapes injury it develops in a satisfactory manner, especially on the friable loam, which is characteristic of certain portions of the higher altitudes. It is reported to be especially fine at some points in the "thermal belt." It is also grown with a fair degree of success on Cecil sandy loam at 1,000 feet altitude, on Cecil clay, and on various other types common to the Piedmont region. As nearly as can be determined, however, from the experiences of the growers, it possesses no merits which render it of preeminent value under most conditions in this section. Its season is early August in Bedford County, Va. It has proved undesirable as a "mountain peach" in certain other sections of the country.

Eaton. Synonym: *Eaton's Golden Cling.*

This variety is known to only a very small number of growers. It is apparently of little value here. At widely separated points on Cecil sandy loam or soil similar to this type and at elevations of about 1,000 feet it grows well, ripening about the middle of September. On a soil of similar character, at 2,000 feet, the tree is reported to be unhealthy and the fruit is said to be "knotty." It is also unsatisfactory on Porters clay at 1,300 feet in Bedford County, Va.

Elberta.

This variety holds a unique place in the development of the peach-growing interests of the country. More than any other, it has entered into the wide extension of peach culture which has taken place during the past few years.

The Elberta is more widely distributed and extensively grown in these regions than any other sort. Under nearly all the combinations of soil, elevation, and other influencing factors which these regions present, it is generally successful. Doubtless, there are conditions more favorable to a high degree of success than others, but as no personal examination of the fruit has been possible, only its general behavior can be stated. Occasionally there has been some complaint of decay, but such reports are unusual and doubtless due to local causes unless attributable to some widespread climatic conditions which are unfavorable. Some seasons the fruit rots badly on young trees which are growing rapidly, when under similar conditions the fruit on older trees does not manifest this weakness, but this is quite generally true of most, if not of all, varieties. Porters sand, Cecil sandy loam, Cecil clay, and Porters clay at the usual elevations of these types, the sandy loams of western North Carolina at 2,000 feet, the red loams and red clay loams of western South Carolina and northeastern Georgia, and Porters black loam with some modifications of this type at elevations reaching nearly

2,000 feet are all conditions under which this variety is said to be satisfactory with usual conditions of climate and other incidental factors.

One of the most important points to consider in connection with extensive plantings of this variety in any section is its season of ripening. On account of its wide range of adaptability the "Elberta season" in the market extends over a long period of time. The earliest shipments at the present time in large quantities to northern markets are made from northeastern Texas and central Georgia and begin usually early in July. About the time the heavy shipments are over from these sections the fruit is beginning to ripen in northern Georgia. In the northern portion of the Piedmont, the season extends well into August. In the Ozark region of Missouri and Arkansas its usual season of ripening is from the latter part of July to the middle of August, though not much of the fruit from this section reaches the eastern markets, where the southern crop is mostly marketed, but by this period in the season varieties of better dessert quality from other eastern sections are filling the markets. Hence the profitable production of this variety in a particular section is fully as much dependent upon its period of ripening in that section as upon its adaptability to the conditions. While this is also true in a measure of all varieties, it applies especially to this one on account of its extensive production at many widely separated points.

George IV.

If the identity is correct, this variety is of special value for Cecil sandy loam at 1,000 feet elevation in the region of Bedford County, Va. It has been referred to by a single grower at this point, who reports it, growing under these conditions, as unusually satisfactory for local markets.

Globe.

A single report from western North Carolina indicates that the variety grown under this name (which is assumed to be correct) is well adapted to the conditions under which it is being grown. These are an elevation of 1,500 to 1,700 feet, a red clay loam containing more or less gravel, sand, and fine particles of mica, and an eastern slope. The tree is said to be very prolific and the fruit to develop finely. The location is in the "thermal belt." Ripening occurs here during August. As a rule the Globe is unproductive as a "mountain peach."

Greensboro.

The only mention of this variety has been made by growers at points intermediate between the two principal peach-growing sections of these regions. On soil somewhat similar to Cecil sandy loam at 1,000 feet elevation, at 2,000 feet on Cecil clay, and at about 2,000 feet on Porters black loam it is highly prized, being considered one of the best early sorts. The fruit is said to ripen uniformly at the same time and is not much subject to decay. Being one of the newer varieties, the Greensboro has not yet been thoroughly tested, but is considered promising thus far. In central Georgia, which is south of the limits under consideration, its season is from the middle to the last of June; in Bedford County, Va., it is three to four weeks later.

Heath Cling. Synonym: *White Heath Cling.*

There is scarcely a commercial orchard in these regions which does not contain this variety. While not grown in such large numbers as many other varieties, it is one of the most widely distributed of any. It has been reported from practically all conditions which exist within the limits of the Piedmont region, and within these limits it appears to reach a uniformly high degree of perfection. The only adverse experience (if the variety is authentic) is from an orchard on Porters black loam at about 2,000 feet elevation in Amherst County, Va., where during a period of seven years only one crop has been produced. Other varieties under the same conditions have borne satisfactorily. The range of ripening in these regions covers the most of September or even greater limits in some cases.

Late Crawford.

Like some of the other varieties referred to, the Late Crawford is grown more or less at widely separated points in the Piedmont region, but not extensively in any one section. In the more important peach-growing portions of the Piedmont it is seldom mentioned. On Cecil clay, Cecil sandy loam at its various altitudes, and Porters clay it is said to give satisfactory returns. At one point in North Carolina having an altitude of 1,700 feet it is also doing fairly well. It ripens from a week to ten days after Early Crawford. As a rule, it does not do well under strictly mountain conditions in certain other sections of the country.

Levy. Synonyms: *Levy's Late, Henrietta.*

In one orchard on the south slope of Tobacco Row Mountain, in Amherst County, Va., the only location in which this peach has been found, it is considered a profitable variety to grow. The elevation is from 500 to 700 feet above the general level of the Piedmont region. The soil is a comparatively loose, friable red loam, approaching Porters sandy loam in its physical properties. Under these conditions the fruit reaches good size and has a rich yellow color which gives it an attractive appearance. It is fairly prolific. Season here, about the middle of September. The Levy is also satisfactory in one or two Piedmont locations in Virginia.

Lorentz.

In Albemarle County, Va., on the lower mountain slopes, from 1,000 to 1,500 feet altitude, this variety is being cultivated by a small number of growers. It ripens here about the middle of September. Its chief value is due to its comparatively late season.

Mountain Rose.

In general, the comments under Late Crawford apply also to this variety. The conditions under which it is being grown with success are essentially the same as for that variety. It has also been located on Porters black loam at 2,000 feet elevation in Amherst County, Va., where it is said to do well, although the fruit is rather small under these conditions. In the Piedmont region of Virginia it reaches maturity early in August.

Oldmixon.

This variety is grown to a very limited extent in Bedford County, Va., on Cecil clay and Cecil sandy loam, where it is giving good satisfaction, and under similar conditions in South Carolina it is considered profitable. It is also doing well in Albemarle County, Va., on the lower slopes of the mountains on a soil which is probably an overlapping of Porters clay and Porters sand. It develops well on the slopes of Tobacco Row Mountain, in Amherst County, but its season of ripening at this point is said to render it undesirable as a general commercial sort, since it conflicts with other more profitable varieties. Early August is its usual time of ripening in this section.

Parsons. Synonym: *Parsons' Early.*

The only report of this variety comes from Bedford County, Va. It is being grown on Porters clay or some modification of this type at about 1,200 feet elevation. It is here considered one of the most satisfactory varieties of its season and deserving of wider attention. Ripens about the middle of July.

Picquet. Synonym: *Picquet's Late.*

In the northern portion of this territory, the Picquet is grown to some extent and with good success on the lower slopes of the mountains where the soil approaches Porters sand in character. In locations at the general level of the Piedmont it is susceptible to scab or brown-spot to a very serious degree. In other sections of the country it has also proved to be rather susceptible to fungous diseases. It blossoms later than most varieties; hence, it may escape injury from late spring frosts when other varieties suffer therefrom. It ripens in early September in the regions above mentioned.

Rivers. Synonym: *Early Rivers.*

Only a small number of growers have this variety. On Cecil sandy loam at 1,000 feet elevation in Bedford County, Va., it usually gives good results. Under these conditions of soil and elevation it is generally less apt to decay than in many places. In the "thermal belt" of North Carolina on a red clay loam containing considerable sand and gravel, it is said to be very fine. The fact that it has set a full crop of fruit when most varieties were killed in the bud or during the blossoming period by severe climatic conditions gives support to a common impression that its buds are more hardy than many varieties. The Rivers reaches maturity early in July in the central sections of the Piedmont region.

St. John. Synonym: *Yellow St. John.*

In Bedford County, Va., at about 1,200 feet elevation on a soil resembling Porters clay, the St. John is said to be more subject to insect attacks than almost any other variety; it also frequently rots severely. It has been reported from North Carolina as successful on a friable red clay loam about 500 feet above the level of the adjacent Piedmont region, and from South Carolina under the usual Piedmont conditions of that section. Season in these sections, middle to the last of July.

Salway.

This variety is known to only a few growers. One, in Bedford County, Va., who is growing it on Cecil sandy loam at about 1,000 feet elevation, considers it among his best varieties under favorable climatic conditions and seldom subject to any disease. Experience in most sections of the country where this variety is grown would indicate that a location which is not well elevated above the surrounding country is not suitable for this variety on account of its susceptibility to peach scab or brown-spot. The fruit as grown in the above-mentioned Bedford County location, is said to develop, as a rule, in a satisfactory manner, ripening about the middle of September. The Salway is also grown to some extent on a similar soil in North Carolina at about 2,000 feet elevation, where it is reported to do well.

Smock.

In Albemarle County, Va., this variety is grown to a limited extent. The conditions under which the Bilyeu reaches its highest degree of perfection are also favorable for this. At the Piedmont levels the fruit does not develop properly, and it is subject to peach scab. Ripens a little before Salway.

Sneed.

The plantings of the Sneed are small and the orchards which contain it are comparatively few in number. That the buds are exceptionally resistent to relatively low temperatures was demonstrated in the spring of 1903, when it escaped injury from frosts while most varieties were severely injured thereby. It has received favorable mention from Bedford County, Va., where it is being grown on Cecil sandy loam at the usual Piedmont altitude. Its adaptability to these conditions seems rather marked in its resistance in 1903 to brown-rot, which was unusually severe on most varieties during that year. Possibly its time of ripening, which occurs here the latter part of June, may have had its bearing upon the amount of decay. Porters clay at 1,200 feet elevation also gives good results in the same county. In North Carolina at 1,500 feet on a friable red clay loam and in South Carolina in the Piedmont region adjacent to the mountains, it is being grown successfully. Here it ripens early in June. In very many places the fruit is apt to decay seriously, but this does not appear to be a conspicuous fault in this section. It is prolific under the conditions named above, but on the sandy loam soils of western North Carolina at 2,000 feet and Porters black loam at a similar altitude in certain other sections, it is said to be undesirable because of its light bearing proclivities.

Stump.

The Stump is a standard sort in many peach-growing sections, but is grown only sparingly in the regions in question. The characteristic soils and elevations of the Piedmont appear to be favorable to it, though it has not attracted any particular attention. Its season in the southern Piedmont region would probably begin the last of July, extending well into August in the northern part.

Triumph.

In Bedford County, Va., this variety has been planted more or less under several combinations of conditions, but with such uniformly unsatisfactory results that its lack of adaptability seems to be well established. Its chief defect is its liability to decay under slightly unfavorable climatic conditions. A few favorable reports concerning it have been noted. One grower who has the Triumph on Porters clay at 1,200 to 1,300 feet elevation reports it to be fairly satisfactory for its season. In North Carolina on a friable red clay loam at 1,500 to 1,700 feet elevation, also in the Piedmont region of South Carolina on a soil similar to Cecil clay but containing more sand than this type, it is favorably regarded, especially at the point referred to in North Carolina, where it reaches an unusually large size for the variety and does not show its usual tendency to decay. It is one of the earliest varieties grown in these regions and its period of ripening is rather short.

Wonderful.

Under the conditions in North Carolina which are described as being particularly well suited to the Triumph, the Wonderful is said to be one of the most satisfactory varieties grown. It is prolific, and the fruit develops to a high degree of perfection.

The varieties which have been referred to in the foregoing notes include the most important sorts which are being grown in the regions under consideration. A considerable number of others have been mentioned by growers in the interviews with them, but for various reasons, such as evident uncertainty relative to the identity, the brief time they have been under trial, or for some other equally sufficient reason, they have not been included in this discussion.

PLUMS.

Plum culture is of minor importance in these regions, and with the exception of a few relatively small orchards it is not a commercial industry. A large number of small plantings exist, consisting in many instances of only a few trees the fruit of which is intended for home use. There are relatively more plums grown in Virginia than in other portions of these regions. In most cases, the trees are given no particular care; hence, their behavior, as noted, usually represents them in a neglected condition.

It should be stated that, as with other stone fruits, the identity of the varieties referred to has been verified in only a few instances. As personal inspection of the fruit itself has been impossible, the notes below regarding varieties are based upon the experience of the growers, and usually their nomenclature has been accepted.

VARIETIES.

Abundance.

This is one of the most widely distributed of the Japanese varieties and is doubtless the most important one being grown in these regions. It rots more or less, but in a favorable season this fault is not serious as a rule. It grows well on nearly all the types of soil in the Piedmont region of Virginia, such as Cecil clay, Cecil sandy loam, and Murrill clay loam. The elevation ranges from about 900 to 1,000 feet. It is also reported to do well on Porters clay at 1,500 feet altitude. Similar reports are given from the Piedmont region of South Carolina. In northeastern Georgia it blossoms relatively early; hence injury by late spring frosts is reported to occur in a large portion of the seasons. This applies to the Japanese varieties as a group. In Albemarle County, Va., the Abundance ripens the first of July.

Bailey.

One grower in Bedford County, Va., prizes this variety especially for home use. He is growing it on Porters clay at about 1,200 feet altitude.

Burbank.

Next to Abundance, this variety is grown more commonly in the Piedmont region than any other. Its behavior corresponds closely to that of Abundance, except that it is more susceptible to brown-rot than that variety. It closely follows Abundance in sequence of ripening.

Damson.

In these regions, as in many others, almost any small blue plum is popularly called a "damson," and while they are generally of the damson type, it is not known how many different varieties or strains are included under this name. It is sufficient to state in this connection that they are generally successful in the Piedmont regions. They are not often found in the mountains. The trees are sometimes severely attacked by black-knot, but with proper attention this does not usually prove serious.

Golden. Synonym: *Gold.*

Of minor importance, though possibly possessing more value than many other varieties of its class. It is a medium-sized, golden yellow, early-ripening sort of fair quality. In the Virginia portion of the Piedmont on Cecil sandy loam it bears well, and it is also favorably reported from a location at an elevation of 1,200 feet and having Porters black loam.

Milton.

A small number of growers have this sort in their collections. It is considered efficient as a pollenizer of the Wildgoose. The quality is fairly good, ripening early. A location which may be mentioned as a type in which good results are obtained is in Albemarle County, Va., at about 900 feet elevation, on Cecil clay. Other similar Piedmont locations, doubtless also certain mountain sites, would prove equally well suited to this variety.

Red June.

On Porters clay in Bedford County, Va., at 1,200 feet altitude, the Red June has given exceptionally good results. In a large collection of varieties it has proved the most satisfactory of the Japanese sorts. It also does well in Albemarle County on Cecil clay at about 900 feet elevation, where it is considered one of the most reliable bearers of any of this group. In North Carolina on a friable red clay loam at 1,500 to 1,700 feet and in the Piedmont region of South Carolina adjacent to the mountains, it is reported to do equally well. In Bedford County, Va., its season is the last of June to early July.

Satsuma.

In many places the Satsuma rots seriously, but this weakness has not been a conspicuous fault in these regions, where, at an elevation of 1,000 feet on Cecil sandy soil

and of about 1,200 on Porters clay in Bedford County, it is grown with a good degree of satisfaction. It is desirable in both North and South Carolina under the conditions described as favorable for the Red June. This is a red-fleshed variety, prized especially for preserving and canning. Ripening occurs in the central Piedmont section not far from the middle of July.

Shropshire. Synonym: *Shropshire Damson.*

Reference has been made to this variety in commendable terms by growers who have it on the principal soil types of the Piedmont region. It is said to be much less susceptible to black-knot than the Blue Damson. It is later in ripening than most other varieties of plums grown in these regions.

Smiley.

Notes under Milton apply in general to this variety; considered an excellent variety for cross-fertilizing Wildgoose.

Wickson.

This is being grown under the principal Piedmont conditions of Virginia and South Carolina, but the trees are of too recent planting to indicate its real merits. A predisposition of the fruit to decay is noticeable in many instances. In Bedford County, Va., its season is early August.

Wildgoose.

In Virginia on Cecil clay at an altitude of about 900 feet this variety is reported to be profitable, especially where it is growing with other varieties, as Milton and Smiley, which insures cross-pollination. In Bedford County, at from 1,300 to 1,500 feet elevation on Porters clay, it is said to be a failure. The trees blossom, but do not set much fruit, and the small amount that does set usually drops. It is probable, however, that this result is due to a lack of cross-pollination. It is well adapted to the conditions in North and South Carolina referred to under Red June. In the central Piedmont sections its season begins about the last of June.

Willard.

Only one grower has mentioned this variety. Its location is in Bedford County on Porters clay, or a modification of it, with an altitude of about 1,200 feet. It does not manifest any qualities which recommend it for these conditions. In the northern Piedmont sections it ripens early in July.

CHERRIES.

There are practically no cherry orchards in the Piedmont and Blue Ridge regions. The small quantity of fruit which is grown is produced on trees that are standing in dooryards, gardens, and along fences. The opportunities for studying the adaptability of varieties is therefore limited. There is relatively more fruit grown in the Virginia portion of the Piedmont region than in other sections. Practically none is produced in the mountains at the present time, though one or two small orchards have recently been planted, but are not yet in bearing.

In view of the status of cherry growing, there is little to be said relative to the question of varieties. It will suffice merely to mention those which are most commonly reported and to state briefly the conditions under which they are grown. The identity of the varieties mentioned has not been verified.

The elevation in most cases is that of the Piedmont region, in close proximity to the mountains—about 1,000 feet. The soils on which cherries have been found are those common to this region and the lower slopes of the foothills. The sweet varieties which have been reported as doing well are Centennial, Napoleon, Oxheart, Rockport, Spanish, Tartarian, and Wood. It is claimed that Elton rots badly, and that on Porters sandy loam Ohio Beauty is unproductive. Among the more common sour varieties there are Carnation, Ida, May Duke, Morello (English), and Richmond.

The usual success of cherries in these regions would seem to indicate that conditions are well suited to the growing of this fruit, with the probability that the mountain conditions would be still more favorable. On account of the very perishable nature of the fruit, several economic factors, such as transportation facilities, location with reference to markets, and the necessary help for handling the fruit, would have to be considered in connection with any commercial development of cherry culture in these regions.

GROUPING OF VARIETIES ACCORDING TO BEHAVIOR AT DIFFERENT ALTITUDES IN DIFFERENT LATITUDES.

For the purpose of summarizing the foregoing varietal notes with reference to the adaptability of the different varieties to the different sections of these regions, the following groups of apple and peach varieties—the two kinds of fruit which are of primary commercial importance in these regions—are compiled from the varietal discussions on previous pages.

In selecting varieties for planting in any place where soil conditions are favorable for orcharding, the climatic influences are doubtless the most potent of any which need to be considered in connection with the behavior of any particular variety or varieties. As the climate of a place depends very largely upon its elevation and latitude, aside from the influence of local surroundings, these two factors are made the basis of the grouping in the present instance, since relative climatic conditions can best be expressed in these terms. Such incidental mention of soil and other conditions as appears necessary is made in connection with certain varieties.

A few varieties of both apples and peaches which are discussed but which can not be recommended for planting in these regions are omitted from the groups; and in some instances, where varieties have not been actually observed in a particular section but in which there is reason to suppose they would be satisfactory, they are included in the group for that section even though no reference to them in that section appears in the discussion. In referring to the groups which contain only a small number of varieties, it may be of advantage,

when selections are being made for planting, to consider also the varieties named in the group having the next higher or lower elevation, as the case may be.

In dividing the regions for grouping the varieties, three sections of the Piedmont and Blue Ridge regions are made on the basis of latitude, namely, northern, central, and southern. In a general way the northern sections of the Piedmont and Blue Ridge regions are considered to be the portions of these regions which are in Virginia; the central sections, the portions in North Carolina; the southern sections, the portions in South Carolina and northern Georgia. In grouping with respect to elevation, 500 feet is taken as the unit of the divisions in the Blue Ridge region. A range of 800 to 1,000 feet covers practically all of the Piedmont region under consideration.

While the varieties named in these groups are intended as a "recommended list" of varieties for the several sections, it should be fully understood that not all the sorts are of equal value for the sections and for the purposes indicated. In selecting his varieties for planting, each grower will need to make discriminations for himself, as individual likes and dislikes are important factors in such a matter as this.

The uses to which the different varieties are adapted are indicated by one or more of the letters *d*, *k*, *m*, *nm*, placed after each name, these letters indicating, respectively, "dessert," "kitchen," "market," and "near-by market" qualities. As here used, "dessert" signifies that the variety is desirable for eating in a fresh state; "kitchen," that the variety is suitable for cooking; "market" refers to salability from the grower's standpoint for dessert or kitchen purposes; "near-by market" is used to designate certain sorts which are of value for marketing in the region where they are grown but which can not be recommended for shipment to far-distant points.

APPLES.

Piedmont Region.

NORTHERN SECTION.

Range of elevation, 800 to 1,000 feet.

Varieties: Ben Davis (m), Bonum (dk), Buckingham (km), Domine (k), Early Harvest (dkm), Early Ripe (km), Fall Cheese (dnm), Fall Orange (dk) especially on more sandy soils, Gravenstein (dkm), Gano (m), Grimes (dm), Kinnard (dkm), McAfee (k), Maiden Blush (km), Milam (d), Nickajack (km), Oldenburg (km), Ralls (dk), Rebel (dm) in some places, Red Astrachan (km), Red June (dm), Rome Beauty (dkm) on the more sandy soils, Shockley (dm), Smith Cider (m), Smokehouse (dkm), Summer Rambo (dk), Virginia Beauty (dm), Wealthy (dkm), Winesap (dkm), Winter Paradise (dnm), Yates (dnm), Yellow Transparent (dkm).

Blue Ridge Region.

NORTHERN SECTION.

Range of elevation, 1,000 to 1,500 feet.

Varieties: Ben Davis (m), Bonum (dk), Buckingham (km), Cannon Pearmain (dkm) at higher elevations, Early Ripe (km), Early Harvest (dkm), Fallawater (knm), Fall Cheese (dknm), Gravenstein (dkm), Gano (m), Grimes (dm), Kinnard (dkm), Limbertwig (km), McAfee (k), Maiden Blush (km), Milam (d), Missouri (km), Nickajack (km), Oldenburg (km), Pennock (m), Pilot (d) at higher points, Ralls (dk), Rebel (dm) in some places, Red Astrachan (km), Red June (dm), Rome Beauty (dkm), Smith Cider (m), Smokehouse (dkm), Summer Rambo (dk), Virginia Beauty (dm), Wealthy (dkm), Willow (m), Winesap (dkm) at lower points, Winter Paradise (dnm), Yellow Newtown (dkm) on certain soils, Yellow Transparent (dkm), York Imperial (m) at higher points.

Range of elevation, 1,500 to 2,000 feet.

Varieties: Arkansas (dm), Ben Davis (m), Buckingham (km), Cannon Pearmain (dkm), Early Harvest (dk), Fallawater (knm), Gravenstein (dkm), Gano (m), Grimes (dm) especially fine on Porters clay at lower elevations, Hoover (k), Jonathan (dm), Limbertwig (km), Maiden Blush (km), Pennock (m), Pilot (d), Ralls (dk), Rome Beauty (dkm), Smokehouse (dkm), Stayman Winesap (dkm), Virginia Beauty (dm), Yellow Newtown (dkm) on certain soils, Yellow Transparent (dkm), York Imperial (m).

Range of elevation, 2,000 to 2,500 feet.

Varieties: Arkansas (dm), Buckingham (km), Cannon Pearmain (dkm), Grimes (dm), Hoover (k), Jonathan (dm), Maiden Blush (km), Pennock (m), Rome Beauty (dkm), Stayman Winesap (dkm), Virginia Beauty (dm), Yellow Newtown (dkm) on certain soils, Yellow Transparent (dkm), York Imperial (m).

APPLES—continued.

PIEDMONT REGION—Continued.

CENTRAL SECTION.

Range of elevation, 800 to 1,000 feet.

Varieties: Ben Davis (m), Bonum (dk), Buckingham (km), Dula (dkm), Early Harvest (dkm), Gravenstein (dkm), Gano (m), Grimes (dm), Kinnard (dkm), Limbertwig (km), Maiden Blush (km), Oldenburg (km), Pine Stump (d), Rebel (dm), Red Astrachan (km), Red June (dm), Shockley (dm), Smokehouse (dkm), Summer Rambo (dk), Wealthy (dkm), Winesap (dkm), Yates (dm), Yellow Transparent (dkm).

BLUE RIDGE REGION—Continued.

CENTRAL SECTION.

Range of elevation, 1,000 to 1,500 feet.

Varieties: Ben Davis (m), Bonum (dk), Buckingham (km), Dula (dkm), Early Harvest (dkm), Gravenstein (dkm), Gano (m), Grimes (dm), Hoover (k), Kinnard (dkm), Limbertwig (km), McAfee (k), Maiden Blush (km), Missouri (km), Oldenburg (km), Pennock (m), Pine Stump (d), Rebel (dm), Red Astrachan (km), Red June (dm), Shockley (dm), Smokehouse (dkm), Summer Rambo (dk), Virginia Beauty (dm), Wealthy (dkm), Winesap (dkm), Winter Paradise (dnm), Yellow Transparent (dkm), York Imperial (m) at higher points.

Range of elevation, 1,500 to 2,000 feet.

Varieties: Ben Davis (m), Bonum (dk), Buckingham (km), Cannon Pearmain (dkm) possibly, Dula (dkm), Early Harvest (dkm), Gravenstein (dkm), Gano (m), Grimes (dm), Hoover (k), Jonathan (dm), Limbertwig (km), Maiden Blush (km), Missouri (km) probably, Oldenburg (km), Pennock (m), Rabun (dm), Red Astrachan (km), Virginia Beauty (dm), Winesap (dkm), Yellow Newtown (dkm) on certain soils, Yellow Transparent (dkm), York Imperial (m).

Range of elevation, 2,000 to 2,500 feet.

Varieties: Ben Davis (m), Bonum (dk), Buckingham (km), Cannon Pearmain (dkm) probably, Early Harvest (dkm), Gano (m), Grimes (dm), Hoover (k), Jonathan (dm), Limbertwig (km), Maiden Blush (dm), Missouri (km) probably, Red Astrachan (km), Rome Beauty (dkm), Stayman Winesap (dkm), Virginia Beauty (dm), Winesap (dkm), Yellow Newtown (dkm) on certain soils, Yellow Transparent (dkm), York Imperial (m).

APPLES—continued.

Piedmont Region—Continued.

SOUTHERN SECTION.

Range of elevation, 800 to 1,000 feet.

Varieties: Ben Davis (m) not a long keeper here, Early Harvest (dkm), Gano (m), Kinnard (dkm), Limbertwig (km), Red Astrachan (km), Red June (dm), Shockley (dm), Terry (dm), Winesap (dkm), Yates (dm), Yellow Transparent (dkm).

Blue Ridge Region—Continued.

CENTRAL SECTION—continued.

Range of elevation, 2,500 to 3,000 feet.

Varieties: Ben Davis (m), Buckingham (km), Early Harvest (dkm), Gano (m), Grimes (dm), Hoover (k), Jonathan (dm), Limbertwig (km), Maiden Blush (km), Missouri (km) probably, Rome Beauty (dkm), Stayman Winesap (dkm), Virginia Beauty (dm), Yellow Newtown (dkm) on certain soils, Yellow Transparent (dkm), York Imperial (m).

Range of elevation, 3,000 feet or more.

Varieties: Early Harvest (dkm), Esopus (dm), Jonathan (dm), Limbertwig (km), Maiden Blush (km), Northern Spy (dkm) at highest points, Stayman Winesap (dkm), Willow (m), Yellow Transparent (dkm), York Imperial (m).

SOUTHERN SECTION.

Range of elevation, 1,000 to 1,500 feet or more.

Varieties: Ben Davis (m) not a long keeper here, Buckingham (km) probably, Disharoon (d), Early Harvest (dkm), Kinnard (dkm), Kittageskee (dk), Limbertwig (km), McAfee (k), Rabun (dm), Red Astrachan (km), Red June (dm), Shockley (dm), Terry (dm), Winesap (dkm), Yates (dm), Yellow Transparent (dkm).

PEACHES.

Piedmont Region.

NORTHERN SECTION.

Range of elevation, 800 to 1,000 feet.

Varieties: Alexander (dm), Bishop (m), Champion (dm) probably, Connett (dm) probably, Crosby (dm), Early Crawford (dm), Elberta (km), George IV (dnm), Greensboro (m), Heath Cling (km), Late Crawford (dm), Mountain Rose (dm), Rivers (dm), Sneed (m).

Blue Ridge Region.

NORTHERN SECTION.

Range of elevation, 1,000 to 1,500 feet.

Varieties: Albright (dm), Alexander (dm), Arkansas Traveler (dm), Bilyeu (km), Bishop (m), Carman (m), Champion (dm), Chinese Cling (km), Connett (m), Crosby (dm), Early Crawford (dm), Elberta (km), Greensboro (m), Heath Cling (km), Mountain Rose (dm), Parson Early (dm), Picquet (d), Salway (m), Smock (m).

PEACHES—continued.

PIEDMONT REGION—Continued.

CENTRAL SECTION.

Range of elevation, 800 to 1,000 feet.

Varieties: Chinese Cling (km), Connett (m) probably, Early Crawford (dm) probably, Elberta (km), Greensboro (m), Heath Cling (km), Late Crawford (dm), Mountain Rose (dm).

SOUTHERN SECTION.

Range of elevation, 800 to 1,000 feet.

Varieties: Alexander (dm), Belle (dm), Carman (dm), Connett (m), Eaton (dm), Elberta (km), Heath Cling (km), Greensboro (m), Rivers (dm), Sneed (m), Triumph (dm).

BLUE RIDGE REGION—Continued.

NORTHERN SECTION—continued.

Range of elevation, 1,500 to 2,000 feet.

Varieties: Alexander (dm), Bilyeu (km), Champion (dm) probably, Connett (m), Elberta (km), Greensboro (m), Salway (m).

Range of elevation, 2,000 to 2,500 feet.

Varieties: Alexander (dm), Amsden (dm), Champion (dm) probably, Bilyeu (km), Elberta (km), Smock (m). Doubtless many other varieties would do well in this section, though comparatively few sorts are now being cultivated commercially.

CENTRAL SECTION.

Range of elevation, 1,000 to 1,500 feet.

Varieties: Bishop (m) possibly, Chinese Cling (km), Connett (m) probably, Early Crawford (dm), Elberta (km), Greensboro (m), Heath Cling (km), Mountain Rose (dm), Rivers (dm).

Range of elevation, 1,500 to 2,000 feet.

Varieties: Beatrice (dm), Bilyeu (km), Chinese Cling (km), Connett (m) probably, Early Crawford (dm), Elberta (km), Globe (dm), Greensboro (m), Heath Cling (km), Rivers (dm), Salway (m), Triumph (dm), Wonderful (dm).

Range of elevation, 2,000 to 2,500 feet.

Varieties: Beatrice (dm), Bilyeu (km), Elberta (km), Greensboro (m), Smock (m). Doubtless many other varieties would do well in this section, though comparatively few sorts are being cultivated commercially.

SOUTHERN SECTION.

Range of elevation, 1,000 to 1,500 feet.

Varieties: Belle (dm), Carman (dm), Chinese Cling (km) at some points, Connett (m) probably, Early Crawford (dm), Elberta (km), Greensboro (m).

PHENOLOGICAL RECORDS.

An extended discussion of phenology is not considered necessary in the present connection. A concise statement describing its practical application to fruit growing will suffice. It should be explained, however, that phenology is, as defined by Bailey,[a] the "science which considers the relationship of local climates to the periodicity of the annual phenomena of living things." Primarily, it has for its object the study of climate in terms of organic life. This, at least, is the viewpoint of the climatologist. He observes organic life that he may have a more intimate knowledge of climatic conditions as they are expressed thereby. While the one studying organic life may observe the same phenomena, he seeks to express the behavior of that life in terms of the climatic influences under which it develops and to determine the relationship of them.

The practical application of phenology to fruit-growing interests is in the study of the influence upon varieties of the varying climatic conditions which prevail from season to season. It is important to know the blossoming period of a variety in relation to the probable time of occurrence of spring frosts; also the date of maturity and the occurrence of fall frosts. In the case of quickly perishable fruits, the exact period of ripening is a most essential consideration, in order that such a selection of varieties can be made that the marketing of each one will occur in a desirable sequence. There are other factors of interest, but perhaps of lesser practical importance. The field of purely scientific application is a large one, but it will not be considered here.

The following records are a compilation of the observations made on some of the more important varieties by a large number of fruit growers, under the direction of this office, in the States directly concerned in the foregoing discussions. No exhaustive deductions and correlations are advisable at this time, but the records are of value as a means of presenting certain varietal information which could not well be expressed in any other manner. While the seasons over which the records extend have been peculiar in some ways, and it is to be regretted that these records do not show more in detail the climatic conditions which have prevailed, yet it is believed that, aside from all scientific value which they possess, they will prove to be an important source of reference in selecting varieties which blossom at such times that they will be most likely to escape injurious frosts and to ripen at desirable periods. The importance of elevation and the influence of latitude are also emphasized in many instances. When considering the matter of cross-pollination to increase fruitfulness, it is important to know what varieties blossom at the same time.

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135 [a] Survival of the Unlike, p. 288.

From the following lists such varieties can be readily selected. In each case the general conditions which are given, under which the observations have been made, will assist the reader in making the necessary correlations in formulating his deductions. For instance, if a variety of plum at 200 feet elevation blossoms on a certain date and another variety at 1,000 feet elevation blossoms on the same date, it would not be safe to conclude that they would be suitable for cross-pollination, since when grown at the same altitude, other things being equal, it is doubtful if they would blossom in the same sequence. Other factors require similar consideration in interpreting the records.

The following list of observers, with their locations, indicates the points at which observations have been made, and due credit is given for the assistance thus rendered. The column at the left of the page, marked "Observer's number," contains the number by which each observer is referred to in the tabulation of phenological data on later pages.

In the following tabulation the varieties are arranged alphabetically; under each variety the locations at which the observations were made are arranged geographically, according to the latitude, the first entry under each variety being the southernmost point at which observations were recorded.

The numbers in the column marked "Observer's number," at the left of the page, correspond with the numbers in the similar column under "List of observers." By referring to this list, the place at which each record was made and the name of the observer can be readily determined.

In many instances the duration of the varieties has been reported in general terms; hence, it has been necessary in compiling the data to assume some specific date as the limit of durability. Therefore the dates appearing under the heading "Keeps until—" should be understood to indicate the durability of the varieties only approximately, but as this quality is so influenced by conditions external to the fruit itself, a liberal interpretation is necessary in any case.

List of observers who have furnished the phenological data included in this bulletin.

Observer's number.	State.	County.	Post-office.	Grower.
1	Virginia	Albemarle	Cismont	J. E. Smith.
2	do	do	Crozet	Walter Whately.
3	do	Amherst	Amherst	T. J. Cunningham.
4	do	Bedford	Bodycamp	J. F. Deboe.
5	do	do	Bedford City	J. D. Keeler.
6	do	do	do	J. D. Lowry.
7	do	do	Colemans Falls	W. H. Taylor.
8	do	do	Lisbon	T. J. Holdren.
9	do	do	Penicks, R. F. D.	M. L. Hatcher.
10	do	do	Stewartsville	R. L. Dearing.
11	do	Botetourt	Troutville	C. E. Layman.
12	do	Elizabeth City	Hampton	Hampton Institute.
13	do	Fairfax	Pender	E. B. Whaley.
14	do	Fauquier	Morrisville	J. A. McLaughlin.
15	do	Gloucester	Roanes	T. J. Meredith.
16	do	Greene	Wetsels	Jos. Westel.
17	do	King George	Comorn	T. T. Arnold.
18	do	Loudoun	Purcellville	A. B. Davis.
19	do	Montgomery	Blacksburg	H. L. Price.
20	do	do	Christiansburg	J. C. Carmody.
21	do	Nelson	Avon	W. B. MacGregor.
22	do	do	Massies Mill	Withers Massie.
23	do	do	Nellys Ford	R. L. Hughes.
24	do	do	Oak Ridge	J. E. Purvis.
25	do	Nottaway	Jennings	E. W. Rogers.
26	do	Prince William	Manassas	J. B. Johnson.
27	do	Richmond	Warsaw	C. H. Constable.
28	do	Roanoke	Vinton	E. L. Wright.
29	do	Rockingham	Dayton	W. J. Cowger.
30	do	Shenandoah	Strasburg	G. A. Copp.
31	North Carolina	Buncombe	Asheville	J. C. Cowan.
32	do	do	Candler	T. P. Gaston.
33	do	Caldwell	Lenoir	J. A. Dula.
34	do	Cumberland	Fayetteville	J. S. Breece.
35	do	Haywood	Waynesville	John Farrior.
36	do	do	do	G. D. Greene.
37	do	Henderson	Bear Wallow	C. Oates.
38	do	do	Fletcher	J. F. Livingston.
39	do	do	Horseshoe	Mark Moore.
40	do	New Hanover	Wilmington	J. D. Woody.
41	do	Polk	Tryon	W. T. Lindsey.
42	do	Watauga	Boone	J. L. Kincaid.
43	do	do	Sands	C. G. Hodges.
44	South Carolina	Akin	Akin	W. Turnbull.
45	do	do	Whitepond	O. L. Weeks.
46	do	Oconee	Seneca	G. W. Giguilliat.
47	do	do	Clemson College	C. C. Newman.
48	do	Pickens	Liberty	J. T. Boggs.
49	do	do	Easley	E. E. Perry.
50	do	Richland	Columbia	L. B. Folk.
51	do	York	Rock Hill	H. B. Buist.
52	Georgia	Bartow	Adairsville	G. W. Boyd.
53	do	Cobb	Atlanta [a]	R. E. Watson.
54	do	Elbert	Middleton	E. B. Heard.
55	do	Floyd	Rome	J. C. Logan.
56	do	do	do	G. H. Miller.
57	do	Franklin	Lavonia	T. W. Dennington.
58	do	Gilmer	Ellijay	H. M. Ellington.
59	do	Habersham	Cornelia	I. C. Wade.
60	do	Irwin	Tifton [a]	N. B. Eastman.
61	do	Jackson	Marcus	J. G. Justice.
62	do	Sumter	Americus	C. T. Broadfield.
63	do	Wilcox	Fitzgerald [a]	Jas. Simpson.

[a] Post-office not in same county as orchard in which observations were made.

Phenological Records—Apples.

ARKANSAS.

Observer's number.	State.	Approximate latitude	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
49	South Carolina	34 50	1,000	SE.	Cecil clay	1904	12	Apr. 4	Apr. 14	Mar. 16	Mar. 22	July 28	Nov. 12	Nov. 14	Mar. 1
12	Virginia	37 0	5	SW.	Sandy loam	1903	7	Apr. 10	Apr. 18	Apr. 5	Apr. 25	June —		Oct. 27	
12	do	37 0	5	SW.	do	1904	8	Apr. 22	Apr. 30	Apr. 20	Apr. 5	June 23	Sept. 15	Oct. 17	Oct. 15
19	do	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 26	May 5	Apr. 18	Apr. 10			Oct. 14	
19	do	37 15	2,170	NW.	do	1903	14	Apr. 10	Apr. 18	Apr. 5	Mar. 27			do	Mar. 1
19	do	37 15	2,170	NW.	do	1904	15	May 2	May 7	May 16	Apr. 19	June 20	Oct. 1	Oct. 15	
8	do	37 20	1,000	N.	Sandy	1904	5	May 10	May 16	May 7			Oct. 20		Mar. 1
11	do	37 25	1,400	NW.	Gravelly clay	1902	6	Apr. 20	Apr. 24	Apr. 8	Apr. 20	July —	Sept. 25		Do.
30	do	38 55	1,000	NE.	Sandy loam	1903	10	Apr. 10	Apr. 22	Apr. 5	Apr. 1	June 10	Oct. 1		June 1

BALDWIN.

		° ′													
33	North Carolina	35 55	1,200	S.	Sandy loam	1904	20	Apr. 15	May 1		May 15		Sept. 7		Sept.
19	Virginia	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 2	Apr. 18	Apr. 8			Sept. 14	
19	do	37 15	2,170	NW.	do	1903	14	Apr. 16	Apr. 26	Apr. 5	Mar. 27		Sept. 9	do	Nov.
19	do	37 15	2,170	NW.	do	1904	15			May 16	Apr. 22	June 20		Oct. 15	
9	do	37 25	1,800	SE.	Sandy loam	1903	10	Apr. 4	Apr. 10	Apr. 6	Apr. 12		Sept. 10		Dec.
7	do	37 30	1,000	NE.	Clay loam	1902	26	Apr. 18	Apr. 21	Apr. —	Apr. 9		Sept. 20	Nov. —	Do.
16	do	38 15	600		Sandy loam	1902	18	do	do	May 5	Apr. 20			Oct. 17	
29	do	38 25	1,350	W.	Gravelly clay	1903	16	Apr. 11	Apr. 20		Apr. 9		Sept. 25		Jan.
14	do	38 30	400	NE.	Cecil clay	1902	5	May 4	May 8	May 15	Apr. 16	Aug. 22		Oct. 22	
14	do	38 30	400	NE.	do	1903	6				Mar. 22	Aug. 1		Oct. 18	
14	do	38 30	400	NE.	do	1904	7				Apr. 7	July 19		Sept. 23	
26	do	38 45	375	SE.	Sandy loam	1903	15	Apr. 9	Apr. 12	May 5	May 15	June 30	Aug. 20	Oct. 25	Nov.
30	do	38 55	1,000	NE.	do	1902	8	Apr. 28	Apr. 29	May 14	Apr. 16	June 15	Sept. 20		Mar.
30	do	38 55	1,000	NE.	do	1903	9	Apr. 5	Apr. 24	May 5	Apr. 1	June 10	Sept. 10		Dec.
30	do	38 55	1,000	NE.	do	1904	10	Apr. 20	May 10	May 20	Apr. 30	do			

Phenological records—Apples—Continued.

BEN DAVIS.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
61	Georgia	34 0	1,400	S.	Cecil clay	1902	15	Apr. 21	Apr. 26				Oct. 3		Dec.
47	South Carolina	34 40	850	W.	do	1902		Apr. 14	Apr. 18	Mar. 21	Apr. 24		Nov. 15	Nov. 27	Mar.
58	Georgia	34 40	1,350	SE.	Clayey	1904	7	Apr. 1		Apr. 3	Apr. 5		Oct. 1		Jan.
48	South Carolina	34 45	1,000	N.	Cecil clay	1904	8	Apr. 10	Apr. 15	Apr. 4	Mar. 18		Oct. —		Feb.
49	do	34 50	1,000	SE.	do	1902	10	Apr. 12	Apr. 23	Mar. 20	Mar. 29	Aug. 20	Nov. 15	Dec. —	Jan.
49	do	34 50	1,000	SE.	do	1903	11	Apr. 11	Apr. 28	Mar. 10	Mar. 16	Aug. 16	Oct. 1	Oct. 25	Mar.
49	do	34 50	1,000	SE.	do	1904	12	Apr. 4	Apr. 13	Mar. 6	Mar. 19	July 25	Nov. 12	Nov. 14	Feb.
34	North Carolina	35 5	150	None.	Sandy loam	1902		Apr. 6	Apr. 18		Mar. 23				
34	do	35 5	150	None.	do	1904		Mar. 23	Mar. 31						
37	do	35 25	1,990	SE.	Mountain loam	1904	15	Apr. 30	May 5		May 5		Sept. 23	Oct. 24	Jan.
38	do	35 25	2,100	W.	Porous loam	1902	15	Apr. 26	May 2	Apr. 5	Apr. 23	July 1	Sept. 20	Oct. 15	Feb.
38	do	35 25	2,100	W.	do	1904	16	Apr. 11	Apr. 16	Apr. 6	Apr. 14				
38	do	35 25	2,100	W.	do	1904	17	Apr. 20	May 2	Apr. 11	May 1	Aug. 8	Oct. 1	Oct. 15	Do.
36	do	35 30	2,875	SW.	Clay loam	1902	10	Apr. 29	May 8	Apr. 1	May 6	July 28	Oct. 15	do	Mar.
36	do	35 30	2,875	SW.	do	1903	11	Apr. 1	Apr. 12	Apr. 28	Apr. 5	July 15	Oct. 20	Oct. 25	Apr.
36	do	35 30	2,875	SW.	do	1904	12	Apr. 16	Apr. 25	Apr. 1	Mar. 23	June 30	Oct. 15	Oct. 16	Feb.
36	do	35 30	3,300	NE.	Porous clay	1902	6	Apr. 21	Apr. 27	Apr. 5	Apr. 24	July 30	Oct. 20	Oct. 5	Mar.
36	do	35 30	3,500	SE.	Gravelly clay	1902	12	May 1	May 10	Apr. 20	May 7	July 29	do	Oct. 3	Do.
36	do	35 30	4,000	NE.	Stony clay	1902	9	do	May 8	Apr. 25	May 9	July 30	do	do	Do.
36	do	35 30	4,500	SE.	Sandy loam	1902	11	Apr. 25	May 3	Apr. 22		do	Oct. 25	Oct. 1	Feb.
36	do	35 30	4,500	SE.	do	1903	12	May 1	May 12	Apr. 28	May 4	July 18	Oct. 10	Oct. 5	May.
32	do	35 30	2,800	E.	Clay loam	1904	8	Apr. 17	Apr. 28	Apr. 20	Apr. 7		Nov. 12	Oct. 14	
31	do	35 35	2,200	S.	do	1904	4	Apr. 15	do	do	Apr. 3			Oct. 15	
43	do	36 15	3,000	SE.	do	1904	8	Apr. 30	May 8	May 3	May 5		Oct. 7	Oct. 11	Do.
12	Virginia	37 0	5	SW.	Sandy loam	1903	7			Apr. 5	Mar. 25	Aug. 25		Oct. 27	
12	do	37 0	5	SW.	do	1904	8	Apr. 21	Apr. 30	Apr. 20	Apr. 15	June 23	Aug. 20	Oct. 17	
20	do	37 10	2,000	NW.	Loam	1902	10	Apr. 26	May 1	May 18	Apr. 20		Oct. 10	Sept. 10	Mar.
4	do	37 15	1,000	N.	Sandy loam	1903	16	Apr. 21	Apr. 11				Sept. 10		Nov.
19	do	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 26	May 3	Apr. 18	Apr. 12		Sept. 25	Sept. 14	
19	do	37 15	2,170	NW.	do	1903	14	Apr. 25	Apr. 30	Apr. 5	Mar. 30		Sept. 30	Sept. 15	
19	do	37 15	2,170	NW.	do	1904	15	May 7	May 10	Apr. 16	Apr. 23	June 22		Oct. 15	
8	do	37 20	1,000	N.	Cecil clay	1904	8	May 15	May 25	May 7			Oct. 20		Mar.
6	do	37 20	1,000	SE.	do	1902	10	Apr. 15	Apr. 20	Mar. 20	Apr. 15	July 15	Oct. 15	Oct. 20	Do.
6	do	37 20	1,000	SE.	do	1903	11	Apr. 20	May 1	Apr. 20	Apr. 20	July 20	Oct. 10	Oct. 15	Do.
6	do	37 20	1,000	SE.	do	1904	12	May 1	May 10	May 5	May 1	July 10	do	Oct. 10	Do.
9	do	37 25	1,800	SE.	do	1903	4	Apr. 4	Apr. 15	Apr. 6	Apr. 15		Sept. 15		Jan.

11	.....do.....	37	25	1,400	NW.	Gravelly clay.....	1902	6	Apr. 21	Apr. 24	Apr. 8	Apr. 21	July —	Sept. 25	.....	Mar.
7	.....do.....	37	30	1,000	NE.	Cecil clay.....	1902	26	Apr. 19	Apr. 22	Mar. —	Apr. 9	.....	Sept. 20	Nov. —	Dec.
7	.....do.....	37	30	1,000	NE.	.....do.....	1903	38	Apr. 18	....do...	Apr. 22	.....	.....	Sept. 15	Oct. 26	Nov.
27	.....do.....	37	55	200	E. & W.	Sandy loam.....	1902	15	Apr. 17	Apr. 23	Apr. 9	Apr. 10	.....	Oct. —	Oct. 30	Dec.
27	.....do.....	37	55	200	E. & W.	.....do.....	1903	16	Mar. 29	Apr. 3	.....	Apr. 5	.....	....do...	.....	
27	.....do.....	37	55	200	E. & W.	.....do.....	1904	17	Apr. 20	Apr. 25	Apr. 6	Apr. 25	.....	Oct. 20	Sept. 7	
16	.....do.....	38	15	600	.....	.....do.....	1904	15	Apr. 19	Apr. 24	May 3	Apr. 18	.....	.....	Oct. 17	
29	.....do.....	38	25	1,350	W.	Gravelly clay.....	1902	16	Apr. 28	May 2	.....	Apr. 17	.....	Sept. 30	.....	Feb.
29	.....do.....	38	25	1,350	W.	.....do.....	1903	17	Apr. 9	Apr. 30	.....	Apr. 9	.....	Oct. —	.....	Do.
14	.....do.....	38	30	400	NE.	Cecil clay.....	1902	15	Apr. 22	Apr. 26	Apr. 15	....do...	Aug. 18	Sept. 26	Oct. 22	Mar.
14	.....do.....	38	30	400	NE.	.....do.....	1902	16	Apr. 2	Apr. 12	Apr. 5	Mar. 21	Aug. 6	Oct. 1	Oct. 18	Do.
14	.....do.....	38	30	400	NE.	.....do.....	1902	17	Apr. 30	May 5	Apr. 23	Apr. 8	July 23	Sept. 26	Sept. 23	Do.
26	.....do.....	38	45	375	SE.	Sandy loam.....	1903	15	Apr. 8	Apr. 11	Apr. 5	Apr. 15	July 2	Sept. 15	Oct. 25	Do.
13	.....do.....	38	50	300	W.	Cecil clay.....	1902	13	Apr. 18	.....	May 30	.....	.....	Oct. 18	Sept. 18	Jan.
30	.....do.....	38	55	1,000	NE.	Sandy loam.....	1902	14	Apr. 23	Apr. 26	Apr. 14	Apr. 14	June 15	Oct. 1	.....	Mar.
30	.....do.....	38	55	1,000	NE.	.....do.....	1903	15	Apr. 6	Apr. 20	Apr. 5	Mar. 27	June 10	....do...	.....	June.
30	.....do.....	38	55	1,000	NE.	.....do.....	1903	16	May 2	May 7	Apr. 20	Apr. 21	....do...	.....	.....	

BONUM.

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34	North Carolina.....	35	5	150	None.	Sandy loam.....	1902	....	Apr. 7	Apr. 17	.....	Mar. 20	.....	.....	.....	
19	Virginia.....	37	15	2,170	NW.	Limestone clay.....	1902	13	Apr. 28	May 3	Apr. 18	Apr. 15	.....	.....	Sept. 14	
11	.....do.....	37	25	1,400	NW.	Gravelly clay.....	1902	12	Apr. 20	Apr. 24	Apr. 8	Apr. 21	July —	Aug. 15	.....	Oct.
26	.....do.....	38	45	375	SE.	Sandy loam.....	1903	10	Apr. 8	Apr. 12	Apr. 5	Apr. 15	.....	Sept. 1	Oct. 25	Dec.

EARLY HARVEST.

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61	Georgia.....	35	5	1,400	.....	Cecil clay.....	1902	18	Apr. 9	Apr. 15	.....	.....	.....	June 12	.....	July.
40	North Carolina.....	34	15	10	SW.	Sandy loam.....	1902	5	Feb. 27	Mar. 12	Apr. 3	Mar. 20	.....	.....	Nov. 24	
47	South Carolina.....	34	40	850	.....	Cecil clay.....	1902	....	Apr. 13	Apr. 24	Mar. 21	Apr. 27	.....	June 20	Nov. 27	Do.
48	.....do.....	34	45	1,000	N.	.....do.....	1904	8	Apr. 8	Apr. 12	Apr. 14	Mar. 20	.....	June —	.....	
49	.....do.....	34	50	1,000	SE.	.....do.....	1904	6	Apr. 4	Apr. 14	Mar. 16	Mar. 22	July 30	July 1	Nov. 14	Do.
34	North Carolina.....	35	5	150	None.	Sandy loam.....	1904	....	Mar. 22	Mar. 28	.....	.....	.....	.....	.....	
37	.....do.....	35	25	1,990	SE.	Mountain loam.....	1904	15	Apr. 20	Apr. 28	Apr. 21	Apr. 25	.....	June 20	Oct. 24	Aug.
38	.....do.....	35	25	2,100	W.	Porous loam.....	1902	17	Apr. 18	Apr. 24	Apr. 5	Apr. 16	July 7	July 10	Oct. 15	Do.
38	.....do.....	35	25	2,100	W.	.....do.....	1903	18	Mar. 28	Apr. 6	Apr. 6	Apr. 8	.....	.....	.....	
38	.....do.....	35	25	2,100	W.	.....do.....	1904	19	Apr. 12	Apr. 20	Apr. 11	Apr. 21	July 26	July 18	Oct. 15	Aug.
36	.....do.....	35	30	2,890	SW.	Clay loam.....	1902	12	Apr. 28	May 5	Apr. 1	May 4	July 30	July 25	....do...	Do.
36	.....do.....	35	30	4,500	SE.	Sandy loam.....	1903	12	May 1	May 10	Apr. 28	May 10	July 15	Aug. 15	Oct. 5	
32	.....do.....	35	30	2,800	E.	Clay loam.....	1904	8	Apr. 18	Apr. 28	Apr. 20	.....	.....	.....	Oct. 14	
31	.....do.....	35	35	2,200	S.	.....do.....	1902	10	Apr. 20	Apr. 26	Apr. 18	Apr. 12	.....	.....	Oct. 10	Do.
31	.....do.....	35	35	2,200	S.	.....do.....	1904	12	Apr. 12	Apr. 28	Apr. 20	Apr. 3	July 1	.....	....do...	
42	.....do.....	36	15	3,250	S.	Sandy loam.....	1904	8	May 5	May 15	Apr. 21	Apr. 26	July 5	Aug. 10	Oct. 15	Sept.
43	.....do.....	36	15	3,000	SE.	.....do.....	1904	12	Apr. 28	May 5	May 3	May 1	.....	....do...	Oct. 11	Do.
12	Virginia.....	37	0	5	SW.	.....do.....	1903	7	.....	.....	Apr. 5	Mar. 23	.....	July 1	Oct. 27	July.
12	.....do.....	37	0	5	SW.	.....do.....	1904	8	Apr. 13	Apr. 26	Apr. 20	Mar. 28	June 23	July 5	Oct. 17	Do.
20	.....do.....	37	10	2,000	NW.	Loam.....	1902	4	Apr. 24	Apr. 28	May 18	Apr. 20	.....	.....	Sept. 10	Aug.

Phenological records—Apples—Continued.

EARLY HARVEST—Continued.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom	Date full bloom.	Date last spring frost	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking.)	Date first fall frost.	Keeps until—
		° ′													
4	Virginia	37 15	1,000	N.	Sandy loam	1903	....	Apr. 1	Apr. 7	.....	.....	June 15	June 15	.....	July.
25	do	37 15	500	S.	do	1903	16	Mar. 30	.....	.....	.....	.....	.....	.....	Do.
19	do	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 2	Apr. 18	Apr. 11	.....	.....	Sept. 14	
19	do	37 15	2,170	NW.	do	1902	14	Apr. 12	Apr. 29	Apr. 5	Mar. 26	.....	.....	do	
19	do	37 15	2,170	NW.	do	1902	15	.....	.....	May 16	Apr. 18	June 20	.....	Oct. 15	
10	do	37 20	950	W.	Porous clay	1902	27	Apr. 12	Apr. 25	Apr. 1	Apr. 15	.....	July 10	Oct. 27	
10	do	37 20	950	W.	do	1903	28	Apr. 2	Apr. 10	Apr. 6	Mar. 28	.....	June 28	Nov. 2	
8	do	37 20	1,000	N.	Cecil clay	1904	5	May 5	May 10	May 7	Apr. 14	.....	June 6	.....	Do.
9	do	37 25	1,800	SE.	Sandy loam	1902	25	Mar. 25	Apr. 6	Apr. 6	Apr. 10	.....	June 24	.....	Aug.
11	do	37 25	1,400	NW.	Gravelly clay	1902	12	Apr. 19	Apr. 23	Apr. 8	Apr. 20	July —	June 15	.....	July.
27	do	37 55	200	E. & W.	Sandy loam	1902	15	Apr. 17	do	Apr. 9	May 10	.....	July —	Oct. 30	Aug.
27	do	37 55	200	E. & W.	do	1903	16	Mar. 28	Apr. 2	.....	Apr. 5	.....	do	.....	Do.
27	do	37 55	200	E. & W.	do	1904	17	Apr. 20	Apr. 25	Apr. 6	Apr. 25	.....	July 10	Sept. 7	
16	do	38 15	600	.....	do	1902	16	Apr. 18	Apr. 20	May 3	Apr. 18	.....	.....	Oct. 17	
14	do	38 30	400	NE.	Cecil clay	1902	2	Apr. 20	Apr. 24	Apr. 15	Mar. 29	Aug. 25	.....	Oct. 22	
14	do	38 30	400	NE.	do	1903	3	Mar. 30	Apr. 5	Apr. 5	Mar. 20	Aug. 3	July 9	Oct. 10	July.
14	do	38 30	400	NE.	do	1904	4	Apr. 26	May 4	Apr. 23	Apr. 3	July 3	.....	Sept. 23	
26	do	38 45	375	SE.	Sandy loam	1903	15	Apr. 8	Apr. 11	Apr. 5	Apr. 15	June 28	July 10	Oct. 25	Do.
30	do	38 55	1,000	NE.	do	1902	18	Apr. 23	Apr. 28	Apr. 14	May 14	June 6	July 1	.....	Do.
30	do	38 55	1,000	NE.	do	1903	19	Apr. 9	Apr. 20	Apr. 5	Mar. 27	June 10	July 4	.....	Do.
30	do	38 55	1,000	NE.	do	1904	20	May 1	May 6	Apr. 20	Apr. 19	do	.....	.....	

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49	South Carolina	34 50	1,000	SE.	Cecil clay	1903	10	Apr. 10	Apr. 28	Mar. 10	Mar. 14	Aug. 15	Sept. 20	Oct. 25	Jan.
49	do	34 50	1,000	SE.	do	1904	11	Apr. 7	Apr. 15	Mar. 16	Mar. 22	July 30	Nov. 12	Nov. 14	Mar.
19	Virginia	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 26	May 2	Apr. 18	Apr. 12	.....	Sept. 25	Sept. 14	
19	do	37 15	2,170	NW.	do	1903	14	Apr. 12	Apr. 27	Apr. 5	Apr. 7	.....	Oct. 1	do	Jan.
19	do	37 15	2,170	NW.	do	1904	15	May 7	May 12	May 16	Apr. 20	June 24	.....	Oct. 15	Mar.
29	do	38 25	1,350	W.	Gravelly clay	1902	4	Apr. 25	May 1	.....	Apr. 10	.....	Oct. 1	.....	Feb.
29	do	38 25	1,350	W.	do	1903	5	Apr. 12	Apr. 22	.....	Apr. 9	.....	Oct. —	.....	Do.

GRAVENSTEIN.

		°	′														
12	Virginia	37	00	5	SW.	Sandy loam	1904	8	Apr. 13	Apr. 26	Apr. 20	Apr. 1	June 26	Aug. 1	Oct. 17	Aug.
19	do	37	15	2,170	NW.	Limestone clay	1903	14	do	Apr. 28	Apr. 5	Mar. 25			Sept. 14	
19	do	37	15	2,170	NW.	do	1904	15	May 2	May 8	May 16	Apr. 20	June 26		Oct. 15	
14	do	38	30	400	NE.	Clay loam	1902	15	Apr. 25	Apr. 26	Apr. 15	Apr. 13			Oct. 22	
14	do	38	30	400	NE.	do	1903	16			Apr. 5				Oct. 18	
14	do	38	30	400	NE.	do	1904	17	Apr. 29	May 4	Apr. 23	Apr. 10	July 14		Sept. 23	
30	do	38	55	1,000	NE.	Sandy loam	1902	8	Apr. 23	Apr. 26	Apr. 14	Apr. 15		Sept. 1		Nov.

GRIMES.

		°	′													
38	North Carolina	35	25	2,100	W.	Porous loam	1902	20	Apr. 24	May 1	Apr. 5	Apr. 22	July 8	Sept. 20	Oct. 15	Jan.
20	Virginia	37	10	2,000	NW.	Loam	1902	10	Apr. 26	do	May 18	Apr. 20		Oct. 10	Sept. 10	Do.
19	do	37	15	2,170	NW.	Limestone clay	1902	13	Apr. 27	May 4	Apr. 18	Apr. 12		Sept. 15	Sept. 14	
19	do	37	15	2,170	NW.	do	1903	14	Apr. 13	Apr. 26	Apr. 5	Apr. 6			do	Oct.
19	do	37	15	2,170	NW.	do	1904	15	May 7	May 12	May 16	Apr. 20	June 24		Oct. 15	
11	do	37	25	1,400	NW.	Gravelly clay	1902	12	Apr. 20	Apr. 23	Apr. 8	Apr. 21	July —	Sept. 15		Dec.
29	do	38	25	1,350	W.	do	1903	11	Apr. 11	Apr. 21		Apr. 9		Sept. —		Do.
26	do	38	45	375	SE.	Sandy loam	1903	10	Apr. 8	Apr. 11	Apr. 5	Apr. 16	July 1	Sept. 1	Oct. 25	Do.
30	do	38	55	1,000	NE.	do	1902	11	Apr. 24	Apr. 29	Apr. 14	Apr. 15	June 15	Sept. 10		Do.
30	do	38	55	1,000	NE.	do	1903	12	Apr. 6	Apr. 20	Apr. 5	Mar. 31	June 10	do		Do.
30	do	38	55	1,000	NE.	do	1904	13	May 4	May 8	Apr. 20	Apr. 25	do			

LIMBERTWIG.

		°	′													
37	North Carolina	35	25	1,990	SE.	Mountain loam	1904	20	Apr. 30	May 5	Apr. 21	Apr. 8		Oct. 20	Oct. 24	Mar.
36	do	35	30	3,500	SE.	Gravelly clay	1902	12	Apr. 29	May 7	Apr. 20	May 10	July 28	Oct. 10	Oct. 3	Jan.
36	do	35	30	4,000	NE.	Stony clay	1902	8	May 1	May 9	Apr. 25	May 8	do	Oct. 20	do	Mar.
36	do	35	30	4,500	SE.	Sandy loam	1902	12	do	May 6	Apr. 22		July 30	do	Oct. 1	Feb.
31	do	35	35	2,200	S.	Clay loam	1904	20	Apr. 15	Apr. 28	Apr. 20	Apr. 3			Oct. 15	
33	do	35	35	1,200	S.	Sandy loam	1904	16	do	May 1		May 15		Nov. 1		Apr.
42	do	36	15	3,250	S.	Clay loam	1904	15	May 10	May 20	Apr. 21	Apr. 23	July 6	Oct. 15	Oct. 15	May.
19	Virginia	37	15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 4	Apr. 18	Apr. 11		Sept. 25	Sept. 14	
19	do	37	15	2,170	NW.	do	1903	14	Apr. 17	Apr. 29	Apr. 5	Mar. 30		Oct. 1	do	
19	do	37	15	2,170	NW.	do	1904	15	May 6	May 11	May 16	Apr. 21	June 20		Oct. 15	
27	do	37	55	200	E. & W.	Sandy loam	1903	15	Mar. 29	Apr. 4		Apr. 5		Oct. —		Mar.

Phenological records—Apples—Continued.

MAIDEN BLUSH.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
19	Virginia	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 27	May 3	Apr. 18	Apr. 10	.....	.....	Sept. 14	
19	....do	37 15	2,170	NW.	....do	1903	14	Apr. 15	Apr. 27	Apr. 5	Apr. 6	.....	.....	....do	
19	....do	37 15	2,170	NW.	....do	1904	15	May 8	May 13	May 16	Apr. 22	June 27	.....	Oct. 15	
11	....do	37 25	1,400	NW.	Gravelly clay	1902	12	Apr. 20	Apr. 24	Apr. 8	Apr. 20	July —	Sept. 25	.....	Dec.
14	....do	38 30	400	NE.	Cecil clay	1902	15	Apr. 24	Apr. 26	Apr. 15	Apr. 13	Aug. 25	Aug. 1	Oct. 22	Aug.
14	....do	38 30	400	NE.	....do	1903	16	Apr. 7	Apr. 12	Apr. 5	Mar. 20	July 28	Aug. 15	Oct. 18	Sept.
14	....do	38 30	400	NE.	Cecil clay	1904	17	May 2	May 5	Apr. 23	Apr. 9	July 17	.....	Sept. 23	
30	....do	38 55	1,000	NE.	Sandy loam	1903	20	Apr. 9	Apr. 20	Apr. 5	Mar. 28	June 10	Aug. 1	.....	Aug.

NORTHERN SPY.

		° ′													
19	Virginia	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 30	May 5	Apr. 18	Apr. 11	.....	.....	Sept. 14	
19	....do	37 15	2,170	NW.	....do	1903	14	....do	May 12	Apr. 5	Apr. 16	.....	Sept. 20	....do	Dec.
19	....do	37 15	2,170	NW.	....do	1904	15	May 9	May 14	May 16	Apr. 28	June 24	.....	Oct. 15	
8	....do	37 20	1,000	N.	Clay loam	1904	15	Apr. 15	Apr. 25	May 7	.....	.....	Oct. 20	.....	Mar.
9	....do	37 25	1,800	SE.	Cecil clay	1903	20	Apr. 10	Apr. 18	Apr. 6	Apr. 20	.....	Aug. —	.....	Dec.
26	....do	38 45	375	SE.	Sandy loam	1903	15	Apr. 15	Apr. 20	Apr. 5	....do	July 2	Sept. 1	Oct. 25	Nov.
30	....do	38 55	1,000	NE.	....do	1902	8	Apr. 26	Apr. 30	Apr. 14	Apr. 22	June 15	Sept. 20	.....	Feb.
30	....do	38 55	1,000	NE.	....do	1903	9	Apr. 18	Apr. 27	Apr. 5	Apr. 6	June 10	Sept. 25	.....	Dec.
30	....do	38 55	1,000	NE.	....do	1904	10	May 6	May 11	Apr. 20	May 2	....do	.....	.....	

OLDENBURG. SYN.: *DUCHESS OF OLDENBURG.*

		° ′													
61	Georgia	34 0	1,400	S.	Clay loam	1902	18	Apr. 4	Apr. 10	.....	.....	.....	June 28	.....	
12	Virginia	37 0	5	SW.	Sandy loam	1903	7	.....	.....	Apr. 5	Mar. 24	.....	July 22	Oct. 27	
12	....do	37 0	5	SW.	....do	1904	8	Apr. 12	Apr. 24	Apr. 20	Apr. 1	June 23	July 18	Oct. 17	
19	....do	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 26	May 2	Apr. 18	Apr. 11	.....	.....	Sept. 14	
19	....do	37 15	2,170	NW.	....do	1903	14	Apr. 20	Apr. 28	Apr. 5	Mar. 27	.....	.....	....do	

19	do	37	15	2,170	NW.	do	1904	15	Apr. 29	May 7	May 16	Apr. 21	June 22		Oct. 15		
11	do	37	25	1,400	NW.	Gravelly clay	1902	12	Apr. 21	Apr. 27	Apr. 8	do	July —	July 1			
14	do	38	30	400	NE.	Clay loam	1902	3			Apr. 15	Apr. 12	Aug. 8		Oct. 22		
14	do	38	30	400	NE.	do	1903	4	Apr. 8	Apr. 13	Apr. 5	Mar. 29	Aug. 3		Oct. 18		
14	do	38	30	400	NE.	do	1904	5	Apr. 29	May 5	Apr. 23	Apr. 10	July 17	Aug. 1	Sept. 23		

RALLS.

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47	South Carolina	34	40	850	W.	Cecil clay	1902		Apr. 23	Apr. 27	Mar. 23	May 5		Nov. 10	Nov. 27	Jan.	
4	Virginia	37	15	1,000	N.	Sandy loam	1903	16	Apr. 19	Apr. 25			June 25	Oct. 10		Do.	
19	do	37	15	2,170	NW.	Limestone clay	1902	13			Apr. 18		July 15	Sept. 14			
19	do	37	15	2,170	NW.	do	1903	14	May 7	May 12	Apr. 5	Mar. 29		do		Do.	
19	do	37	15	2,170	NW.	do	1904	15			May 16	May 6		Oct. 15			
8	do	37	20	1,000	N.	Cecil clay	1904	5	May 5	May 25	May 7			Oct. 20		Mar.	
6	do	37	20	1,000	SE.	do	1902	15	May 1	May 10	Mar. 20	May 1	Aug. 1	Oct. 15	Oct. 20	Do.	
6	do	37	20	1,000	SE.	do	1903	16	May 10	May 20	Apr. 20	May 10	do	Nov. 1	Oct. 15	Feb.	
6	do	37	20	1,000	SE.	do	1904	17	May 15	May 25	May 5	May 15	July 20	do	Oct. 10	Do.	
7	do	37	30	1,000	NE.	Clay loam	1902	26	May 1	May 4	Mar. —	Apr. 20		Oct. 15	Nov.	Do.	
7	do	37	30	1,000	NE.	do	1904	28	do	May 3	Apr. 22			Sept. 15	Oct. 16	Do.	
22	do	37	50	800	SE.	do	1903	15	Apr. 26	May 10	Apr. 15						
16	do	38	15	600		Sandy loam	1902	18	Apr. 24	Apr. 28	May 3	Apr. 24			Oct. 17		
14	do	38	30	400	NE.	Clay loam	1902	2			Apr. 15	Apr. 22	Aug. 29		Oct. 22		
14	do	38	30	400	NE.	do	1903	3			Apr. 5	Apr. 13	Aug. 4		Oct. 18		
14	do	38	30	400	NE.	do	1904	4			Apr. 23	Apr. 29	July 20	Oct. 1	Sept. 23		
26	do	38	45	375	SE.	Sandy loam	1903	15	Apr. 6	Apr. 22	Apr. 5	Apr. 24	July 8	Sept. 30	Oct. 25	Feb.	
30	do	38	55	1,000	NE.	do	1902	19	Apr. 30	May 3	Apr. 14	Apr. 23	June 20	Oct. 1		Mar.	
30	do	38	55	1,000	NE.	do	1903	20	Apr. 27	May 2	Apr. 5	Apr. 9	June 10	Oct. 26		June.	
30	do	38	55	1,000	NE.	do	1904	21	May 8	May 13	Apr. 20	May 2	do				

RED ASTRACHAN.

		°	′														
61	Georgia	34	5	1,400	S.	Clay loam	1902	18	Apr. 16	Apr. 20				June 18		June.	
40	North Carolina	34	15	10	SW.	Sandy loam	1902	8		Mar. 24	Apr. 3	Mar. 28			Nov. 24	July.	
47	South Carolina	34	40	850	W.	Cecil clay	1902		Apr. 17	Apr. 22	Mar. 21	Apr. 26		June 15	Nov. 27	Do.	
49	do	34	50	1,000	SE.	do	1902	10	Apr. 11	do	Mar. 20	Mar. 27	Aug. 18	June 25	Dec.	Do.	
49	do	34	50	1,000	SE.	do	1903	11	Apr. 10	Apr. 28	Mar. 10	Mar. 17	Aug. 12	do	Oct. 25	Do.	
49	do	34	50	1,000	SE.	do	1904	12	Apr. 1	Apr. 9	Mar. 16	Mar. 19	July 26	July 10	Nov. 14	Do.	
38	North Carolina	35	25	2,100	W.	Porous loam	1902	19	Apr. 18	Apr. 24	Apr. 5	Apr. 16	June 25	July 1	Oct. 15	Do.	
38	do	35	25	2,100	W.	do	1902	20	Mar. 31	Apr. 7	Apr. 6	Apr. 8					
38	do	35	25	2,100	W.	do	1902	21	Apr. 12	Apr. 20	Apr. 11	Apr. 22	July 26	July 10	Oct. 15	July.	
31	do	35	35	2,200	S.	do	1902	10	Apr. 20	Apr. 26	Apr. 18	Apr. 12			do	Do.	
31	do	35	35	2,200	S.	do	1904	12	Apr. 12	Apr. 28	Apr. 20	Apr. 3			do		
43	do	36	15	3,000	SE.	Clay loam	1904	10	Apr. 25	May 1	May 3	May 1		Aug. 5	Oct. 11	Aug.	
12	Virginia	37	0	5	SW.	Sandy loam	1903	7	Mar. 31	Apr. 10	Apr. 5	Mar. 22		July 5	Oct. 27	July.	
12	do	37	0	5	SW.	do	1904	8	Apr. 12	Apr. 20	Apr. 20	Mar. 27	June 28	July 20	Oct. 17	Do.	

Phenological records—Apples—Continued.

RED ASTRACHAN—Continued.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
4	Virginia	37 15	1,000	N.	Sandy loam	1902	15	Apr. 19	Apr. 25						
4	do	37 15	1,000	N.	do	1903	16	Apr. 1	Apr. 8			June 5	June 18		July.
19	do	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 2	Apr. 18	Apr. 11			Sept. 14	
19	do	37 15	2,170	NW.	do	1903	14	Apr. 16	Apr. 20	Apr. 5	Mar. 30			do	
19	do	37 15	2,170	NW.	do	1904	15	May 4	May 10	May 16	Apr. 20	June 20		Oct. 15	
11	do	37 25	1,400	NW.	Gravelly clay	1902	12	Apr. 21	Apr. 24	Apr. 8	Apr. 21	July —	July 1		Do.
27	do	37 55	200		Sandy loam	1902	15	Apr. 17	Apr. 23	Apr. 9	May 10		July —	Oct. 30	Aug.
27	do	37 55	200		do	1903	16	Mar. 28	Apr. 2		Apr. 5		do		July.
27	do	37 55	200		do	1904	17	Apr. 20	Apr. 25	Apr. 6	Apr. 25		July 1	Sept. 7	
14	do	38 30	400	NE.	Clay loam	1902	3	Apr. 25	Apr. 27	Apr. 15	Apr. 13	Aug. 23		Oct. 22	
14	do	38 30	400	NE.	do	1903	4	Apr. 1	Apr. 9	Apr. 5	Mar. 21	Aug. 1	July 15	Oct. 18	Do.
14	do	38 30	400	NE.	do	1904	5	May 1	May 6	Apr. 23	Apr. 9	July 11		Sept. 23	
26	do	38 45	375	SE.	Sandy loam	1903	15	Apr. 5	Apr. 8	Apr. 5	Apr. 15	June 28		Oct. 25	
30	do	38 55	1,000	NE.	do	1902	18	Apr. 22	Apr. 24	Apr. 14	do	June 15	June 28		Do.
30	do	38 55	1,000	NE.	do	1903	19	Apr. 8	Apr. 18	Apr. 5	Mar. 25	June 10	July 1		Aug.
30	do	38 55	1,000	NE.	do	1904	20	May 1	May 6	Apr. 20	Apr. 20	do			

ROME BEAUTY.

		° ′													
42	North Carolina	36 15	3,250	S.	Clay loam	1904	10	May 12	May 22	Apr. 21	Apr. 25	July 18	Oct. 10	Oct. 15	May.
19	Virginia	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 5	Apr. 18	Apr. 20				
30	do	38 55	1,000	NE.	Sandy loam	1902	14	Apr. 25	Apr. 30	Apr. 14	Apr. 18	June 15	Sept. 15		Mar.
30	do	38 55	1,000	NE.	do	1903	15	Apr. 13	Apr. 27	Apr. 5	Apr. 2	June 10	Sept. 25		Jan.
30	do	38 55	1,000	NE.	do	1904	16	May 4	May 10	Apr. 20	Apr. 29	do			

SHOCKLEY.

		° ′													
53	Georgia	33 30	1,000	NW.	Loam	1903	4	Mar. 20	Mar. 24	May 3					Mar.
61	do	34 5	1,400	S.	Clay loam	1902	20	Apr. 10	Apr. 15				Oct. 1		Jan.
59	do	34 30	1,600	N.	do	1904	12	Apr. 2	Apr. 12				Nov. 10	Nov. 10	Apr.

47	South Carolina	34	40	850	W.	Cecil clay	1902	....	Apr. 18	Apr. 21	Mar. 21	Apr. 24		Nov. 20	Nov. 27	Do.
46	....do	34	40	900	W.	....do	1904	8	Apr. 1	Apr. 9	Mar 24			Oct. 15		Jan.
58	Georgia	34	40	1,350	SE.	Clay loam	1904	15	....do		Apr. 3	Apr. 5		....do		June.
48	South Carolina	34	45	1,000	N.	Cecil clay	1904	8	Apr 8	Apr. 13	Apr. 4	Mar 18		Oct. —		Mar.
49	....do	34	50	1,000	SE.	....do	1902	10	Apr. 11	Apr. 23	Mar. 20	Mar 28	Sept. 1	Nov. 20	Dec. —	Do.
49	....do	34	50	1,000	SE.	....do	1903	11	Apr 1	Apr. 12	Mar. 10	Mar. 18	Aug 20	Oct. 1	Oct. 25	Do.
49	....do	34	50	1,000	SE.	....do	1904	12	Apr. 2	....do	Mar. 16	Mar. 19	July 25	Nov. 12	Nov. 14	Do.
34	North Carolina	35	5	150	None.	Sandy loam	1902	....	Apr. 8	Apr 20	Mar. 25					
34	....do	35	5	150	None.	....do	1904	....	Apr. 1	Apr. 7						
41	....do	35	15	1,700	SE.	Mountain loam	1903	8	....do	....do	Feb. —				Dec. —	
39	....do	35	20	2,180	NE.	Clay loam	1904	15	May 1	May 10	Apr. 17	Apr. 25		Oct. —	Oct 15	Mar.
37	....do	35	25	1,990	SE.	Mountain loam	1904	15	Apr 28	May 4	Apr. 21	May 10		Oct. 20	Oct. 24	Do.
36	....do	35	30	4,500	SE.	Sandy loam	1903	12	May 2	May 8	Apr. 28	May 8	July 20	Oct. 1	Oct. 5	Jan.
19	Virginia	37	15	2,170	NW.	Limestone clay	1902	13	Apr. 30	May 3	Apr. 18	Apr. 10			Sept. 14	
19	....do	37	15	2,170	NW.	....do	1903	14	Apr 15	Apr 27	Apr 5	Apr. 5		Sept. 30	....do	
19	....do	37	15	2,170	NW.	....do	1904	15	May 6	May 10	May 16	Apr. 16	June 24		Oct. 15	
8	....do	37	20	1,000	N.	Cecil clay	1904	12	May 15	May 25	May 7	Apr. 17		Oct. 20		Mar.
9	....do	37	25	1,800	SE.	....do	1903	4	Apr. 4	Apr 10	Apr. 6	Apr. 18		Oct. 1		Do.

SMOKEHOUSE.

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19	Virginia	37	15	2,170	NW.	Limestone clay	1902	13	Apr. 24	May 2	Apr. 18	Apr. 13			Sept. 14	
28	....do	37	20	1,200	W.	Porous clay	1902	25	Apr. 16	Apr 24		Apr. 4				
11	....do	37	25	1,400	NW.	Gravelly clay	1902	6	Apr. 20	....do	Apr. 8	Apr. 21	July —	Sept. 25		Dec.
27	....do	37	55	200		Sandy loam	1903	16	Mar. 30	Apr. 4		Apr. 5		Aug. 20		Sept.
14	....do	38	30	400	NE.	Clay loam	1902	15	Apr. 23	Apr. 25	Apr. 15	Apr. 4	Aug. 20		Oct. 22	Do.
14	....do	38	30	400	NE.	....do	1903	16	Apr. 1	Apr. 10	Apr. 5	Mar. 22	Aug. 7		Oct. 18	
14	....do	38	30	400	NE.	....do	1904	17	Apr. 27	May 2	Apr. 23	Apr. 5	Aug. 2		Sept. 23	Sept.
13	....do	38	50	300	W.	....do	1902	13	Apr. 15		Apr. 30			Sept. 1	Sept. 18	
36	North Carolina	35	30	2,875	SW.	....do	1902	12	Apr 28	May 8	Apr. 1	May 4	July 30	Oct. 20	Oct. 15	Feb.
36	....do	35	30	4,000	NE	Stony clay	1902	6	....do	May 6	Apr. 25	May 7	July 24	Oct. 10	Oct. 3	Dec.
36	....do	35	30	4,500	SE.	Sandy loam	1902	12	May 1	....do	Apr. 22		July 27	Oct. 21	Oct. 1	Jan.
33	....do	35	55	1,200	S.	....do	1904	12	Apr 15	May 1		May 15		Oct. —		
42	....do	36	15	3,250	S.	Clay loam	1904	16	May 8	May 15	Apr. 21	Apr. 24	July 21	Oct. 5	Oct. 15	Feb.

WINESAP.

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61	Georgia	34	5	1,400	S.	Clay loam	1902	20	Apr. 18	Apr. 22				Aug. 15		Dec.
59	....do	34	30	1,600	N.	....do	1904	12	Apr. 2	Apr. 12				Nov. 10	Nov. 10	Apr.
49	South Carolina	34	50	1,000	SE.	Cecil clay	1902	12	Apr. 12	Apr. 25	Mar. 20	Mar. 28	Aug. 28	Nov. 20	Dec —	Mar.
41	North Carolina	35	15	1,700	SE.	Mountain loam	1903	8	Apr. 3	Apr. 11	Feb. —				....do	
39	....do	35	20	2,180	NE.	Clay loam	1904	15	May 1	May 10	Apr. 17	Apr. 25	May 30	Oct —	Oct 15	Do.
37	....do	35	25	1,990	SE.	Mountain loam	1904	20	Apr. 28	May 3	Apr. 21	May 8		Oct. 10	Oct. 24	Dec.
38	....do	35	25	2,100	W.	Porous loam	1902	18	Apr. 24	May 1	Apr. 5	Apr. 22	July 4	Sept. 30	Oct. 15	May.
38	....do	35	25	2,100	W.	....do	1903	19	Apr. 8	Apr. 13	Apr. 6	Apr. 13	Aug. 6			

Phenological records—Apples—Continued.

WINESAP—Continued.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
38	North Carolina	35 25	2,100	W.	Porous loam	1904	20	Apr. 17	Apr. 28	Apr. 11	Apr. 27	.....	Oct. 1	Oct. 15	Apr.
36	do	35 30	2,875	SW.	Clay loam	1902	10	Apr. 30	May 10	Apr. 1	May 5	July 31	Oct. 15	do	Feb.
36	do	35 30	2,875	SW.	do	1903	11	Apr. 4	Apr. 14	Apr. 28	Apr. 1	July 12	do	Oct. 25	Do.
36	do	35 30	2,875	SW.	do	1904	12	Apr. 15	Apr. 25	Apr. 1	Mar. 23	June 30	Oct. 20	Oct 16	Do.
36	do	35 30	3,300	NE.	Porous clay	1902	6	Apr. 21	Apr. 27	Apr. 15	Apr. 21	July 31	do	Oct. 5	Jan.
36	do	35 30	3,500	SE.	Gravelly clay	1902	12	Apr. 29	May 8	Apr. 20	May 5	July 30	Oct. 10	Oct. 3	Mar.
36	do	35 30	4,000	NE.	Stony clay	1902	6	May 1	do	Apr. 25	May 9	July 26	Oct 15	do	Feb.
36	do	35 30	4,500	SE.	Sandy loam	1902	13	Apr. 25	May 3	Apr. 22	May 8	July 30	Oct. 20	Oct. 1	Jan.
36	do	35 30	4,500	SE.	do	1903	14	May 3	May 10	Apr. 28	May 9	July 18	do	Oct 5	May.
32	do	35 30	2,800	E.	Clay loam	1904	8	Apr. 17	Apr. 28	.....	Apr. 7	.....	.....	Oct. 14	
31	do	35 35	2,200	S.	do	1904	12	Apr. 15	do	.....	Apr. 3	.....	.....	Oct. 15	
33	do	35 35	1,200	S.	Sandy loam	1904	20	do	May 1	.....	May 15	.....	.....	.....	
12	Virginia	37 0	5	S.	do	1904	8	Apr. 24	Apr. 29	Apr. 20	Apr. 4	June 23	Aug. 15	Oct. 17	
20	do	37 10	2,000	NW.	Dark loam	1902	8	Apr. 25	May 3	May 18	.....	.....	Oct. 20	Sept. 10	Apr.
4	do	37 15	1,000	N.	Sandy loam	1902	15	Apr. 21	Apr. 26	.....	.....	June 20	.....	.....	Jan.
4	do	37 15	1,000	N.	do	1903	16	Apr. 4	Apr. 12	.....	.....	.....	.....	.....	
19	do	37 15	2,170	N.	Limestone clay	1902	13	Apr. 28	May 3	Apr. 18	Apr. 12	.....	Sept. 25	Sept. 14	
19	do	37 15	2,170	N.	do	1903	14	Apr. 30	May 15	Apr. 5	Apr. 5	.....	Sept. 30	do	
19	do	37 15	2,170	N.	do	1904	15	.....	May 12	May 16	Apr. 23	June 24	.....	Oct. 15	
28	do	37 20	1,200	W.	Porous clay	1902	20	Apr. 17	Apr. 25	.....	Apr. 10	.....	.....	.....	
8	do	37 20	1,000	N.	Cecil clay	1904	5	May 15	May 25	May 7	.....	.....	Oct. 20	.....	Mar.
6	do	37 20	1,000	SE.	do	1902	15	Apr. 15	Apr. 20	Mar. 20	Apr. 15	July 15	Oct. 15	Oct. 20	Apr.
6	do	37 20	1,000	SE.	do	1903	16	Apr. 20	May 1	Apr. 20	Apr. 20	July 20	Oct. 10	Oct. 15	Do.
6	do	37 20	1,000	SE.	do	1904	17	May 1	May 10	May 5	May 1	July 10	do	Oct. 10	Do.
9	do	37 25	1,500	SE.	do	1903	10	Apr. 7	Apr. 16	Apr. 6	Apr. 20	.....	Oct. 1	.....	Feb.
11	do	37 25	1,400	NW.	Gravelly clay	1902	12	Apr. 24	Apr. 26	Apr. 8	Apr. 23	July —	Sept. 25	.....	Mar.
7	do	37 30	1,000	NE.	Clay loam	1902	26	Apr. 19	Apr. 22	Mar. —	Apr. 9	.....	do	Nov. —	Feb.

VIRGINIA BEAUTY.

		°	′														
3	Virginia	37	35	500	SE.	Cecil clay	1904	20	Apr. 24	Apr. 26		Apr. 10		Sept. 1		
22	do	37	50	800	SE.	Porous clay	1903	20	Apr. 4	Apr. 15	Apr. 15	Apr. 25		Sept. 15		June.
23	do	37	50	1,000	SE.	Clay loam	1903	6	Apr. 5	Apr. 18	Apr. 5	Apr. 20	June 1	Oct. 10	Oct. 27	May.
21	do	38	0	1,300	N.	Black loam	1903	19	do	do	do	Mar. 25		Oct. 14	Oct. 15	Apr.
1	do	38	5	800	W.	Sandy loam	1903	17	Apr. 4	Apr. 13	Apr. 7	Apr. 30		Oct. 1	Oct. 20	Dec.
16	do	38	15	600		do	1902	15	Apr. 18	Apr. 23	May 3	Apr. 18			Apr. 17	
29	do	38	25	1,350	W.	Gravelly clay	1902	16	Apr. 26	Apr. 30	Apr. 14			Sept. 30		Mar.
29	do	38	25	1,350	W.	do	1903	17	Apr. 12	Apr. 22	Apr. 8			Oct. —		Do.
14	do	38	30	400	NE.	Clay loam	1902	15	Apr. 23	Apr 27	Apr. 15	Apr. 16	Aug. 16	Oct. 15	Oct. 22	Apr.
14	do	38	30	400	NE.	do	1903	16	Apr 7	Apr. 14	Apr. 5	Mar. 27	Aug. 5	Oct. 1	Oct. 18	Do.
14	do	38	30	400	NE.	do	1904	17	May 1	May 6	Apr. 22	Apr. 9	Aug. 4	Sept. 26	Sept. 23	Do.
26	do	38	45	375	SE.	Sandy loam	1903	15	Apr. 10	Apr. 15	Apr 5	Apr. 18	June 30.	Sept. 15	Oct. 25	Mar.
13	do	38	50	300	W.	Clay loam	1902	13			May 30			Oct. 18	Sept. 18	Jan.
30	do	38	55	1,000	NE.	Sandy loam	1902	14	Apr. 24	Apr. 29	Apr. 14	Apr. 17	June 15	Sept. 25		Mar.
30	do	38	55	1,000	NE.	do	1903	15	Apr. 10	Apr. 22	Apr. 5	Mar. 30	June 10	Sept. 30		June.
30	do	38	55	1,000	NE.	do	1904	16	May 3	May 9	Apr. 20	Apr. 27	do			
18	do	39	10	600	NW.	Clay loam	1903	17	Apr. 17	Apr. 23						

WINTER PARADISE.

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8	Virginia	37	20	1,000	N.	Cecil clay	1904	12	May 12	May 18	May 7			Oct. 20		Mar.
14	do	38	30	400	NE.	Clay loam	1902	15	Apr. 20	Apr. 27	Apr. 15	Mar. 31	Aug. 16	Sept. 26	Oct. 22	Jan.
14	do	38	30	400	NE.	do	1903	16	Mar. 31	Apr. 5	Apr. 5	Mar. 23	Aug. 1	Sept. 15	Oct. 18	Nov.
14	do	38	30	400	NE.	do	1904	17	Apr. 30	May 5	Apr. 23	Apr. 4	July 27	do	Sept. 23	Jan.
30	do	38	55	1,000	NE.	Sandy loam	1903	20	Apr. 9	Apr. 21	Apr. 5	Mar. 28	June 10	Sept. 25		Dec.

YELLOW NEWTOWN.

		°	′													
36	North Carolina	35	30	4,500	SE.	Black loam	1902	12	May 1	May 6	Apr. 22		July 31	Oct. 25	Oct. 1	Dec.
28	Virginia	37	20	1,200	W.	Porous clay	1902	25	Apr. 10	Apr. 25		Apr. 10		Oct. 15		Mar.
9	do	37	25	1,500	SE.	Cecil clay	1903	20	do	Apr. 19	Apr. 6	Apr. 25				
24	do	37	45	1,000	SW.	Clay loam	1904	15	Apr 25		Apr. —	Apr. 10	June 15			
22	do	37	50	800	SE.	do	1903	20	Apr. 6	Apr. 15	Apr. 15	Apr. 25		Sept. 15		June
21	do	38	0	1,100	N.	Black loam	1903	19			Apr. 5	Mar. 26		Sept. 28	Oct. 15	May.
30	do	38	55	1,000	NE.	Sandy loam	1902	6	Apr. 24	Apr. 29	Apr. 14	Apr. 16	June 20			

Phenological records—Apples—Continued.

YELLOW TRANSPARENT.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
61	Georgia	34 5	1,400	S.	Clay loam	1902	12	Apr. 15	Apr. 19				June 2		June.
47	South Carolina	34 40	850	W.	Cecil clay	1902		Apr. 19	Apr. 14	Mar. 21	Apr. 29		June 27	Nov. 27	July.
49	do	34 50	1,000	SE	do	1902	10	Apr. 12	Apr. 22	Mar. 20	Mar. 29	Aug. 16	June 20		June.
49	do	34 50	1,000	SE.	do	1903	11	Apr. 11	Apr. 29	Mar. 10	Mar. 17	Aug. 11	June 25		Do.
49	do	34 50	1,000	SE.	do	1904	12	Apr. 6	Apr. 14	Mar. 16	Mar. 23	July 30	July 10		July.
43	North Carolina	36 15	3,000	SE.	Clay loam	1904	8	Apr. 20	Apr. 25	May 3	Apr. 20		July 20		
4	Virginia	37 15	1,000	N.	Sandy loam	1902	7	Apr. 21	Apr. 28						
4	do	37 15	1,000	N.	do	1903	8	Apr. 6	Apr. 11			June 1	June 10		July.
19	do	37 15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 2	Apr. 18	Apr. 10			Sept. 14	
19	do	37 15	2,170	NW.	do	1903	14	Apr. 15	Apr. 26	Apr. 5	Apr. 8			do	
19	do	37 15	2,170	NW.	do	1904	15			May 16	Apr. 21	June 20		Oct. 15	
8	do	37 20	1,000	N.	Cecil clay	1904	8	May 4	May 14	May 7	Apr. 17		July 20		
9	do	37 25	1,500	SE.	do	1903	6	Apr. 26	Apr. 8	Apr. 6	Apr. 10				
7	do	37 30	1,000	NE.	Clay clay	1902	5	Apr. 21	Apr. 24	Mar. —	Apr. 8		July —	Nov. —	
27	do	37 55	200	E. & W.	Sandy loam	1902	15	Apr. 17	Apr. 23	Apr. 9	Apr. 10		July —	Oct. 30	
27	do	37 55	200	E. & W.	do	1903	16	Mar. 28	Apr. 2		Apr. 5		July —		
27	do	37 55	200	E. & W.	do	1904	17	Apr. 20	Apr. 25	Apr. 6	Apr. 25		July 10	Sept. 9	
14	do	38 30	400	NE.	Clay loam	1902	4			Apr. 15	Apr. 15	Aug. 24		Oct. 22	
14	do	38 30	400	NE.	do	1903	5	Apr. 7	Apr. 12	Apr. 5	Mar. 28	Aug. 1	June 29	Oct. 18	July.
14	do	38 30	400	NE.	do	1904	6	Apr 27	May 6	Apr. 23	Apr. 7	July 12	July 18	Sept. 23	Do.
26	do	38 45	375	SE.	Sandy loam	1903	11	Apr. 8	Apr. 12	Apr. 5	Apr. 17	June 30	July 6	Oct. 25	Do.

YORK IMPERIAL.

		°	′														
49	South Carolina	34	50	1,000	SE.	Cecil clay	1902	10	Apr. 12	Apr. 24	Mar. 20	Mar. 31	Sept. 1	Nov 20	Dec. —		Mar.
49	do	34	50	1,000	SE.	do	1903	11	Apr 1	Apr 10	Mar. 10	Mar. 18	Aug. 22	Oct. 15	Oct. 25		Do.
49	do	34	50	1,000	SE.	do	1904	12	Apr 7	Apr. 15	Mar. 16	Mar. 21	July 29	Nov. 12	Nov. 14		Do.
39	North Carolina	35	20	2,180	NE.	Clay loam	1904	15	May 1	May 10	Apr. 17	Apr. 25		Oct. —	Oct. 15		
37	do	35	25	1,990	SE.	Mountain loam	1904	20	Apr. 30	May 5	Apr 21	May 10	June 15	Sept. 25	Oct. 24		Nov.
35	do	35	30	2,700	N.	Clay loam	1902	12			Apr. 26			Sept. 15	Oct. 16		
36	do	35	30	2,875	SW.	do	1903	7	Apr 6	Apr. 16	Apr. 28	Apr. 4	July 15	Oct. 28	Oct. 25		Feb.
36	do	35	30	2,875	SW	do	1904	8	Apr. 15	Apr. 28	Apr. 1	Mar. 25	July 4	Oct. 15	Oct. 16		Dec.
36	do	35	30	3,300	NE.	Gravelly clay	1902	7	Apr. 22	do	Apr 15	Apr. 22	July 27	Oct. 25	Oct. 5		Feb.
36	do	35	30	4,500	SE.	Black loam	1902	13	May 1	May 6	Apr. 22		July 31	Oct. 20	Oct. 1		Mar.
36	do	35	30	4,500	SE.	do	1903	14	May 5	May 18	Apr. 28	May 4	July 25	Oct. 15	Oct. 5		Feb.
42	do	36	15	3,250	S.	Clay loam	1904	12	May 10	do	Apr. 21	Apr. 27	July 22	Oct. 10	Oct. 15		Apr.
12	Virginia	37	0	5	SW.	Sandy loam	1904	8	Apr. 23	Apr. 30	Apr. 20	Apr. 4	June 23	Sept. 5	Oct. 17		Nov.
20	do	37	10	2,000	NW.	Dark loam	1902	10	Apr. 26	May 1	May 18	Apr. 20		Oct. 10	Sept. 10		Apr.
25	do	37	15	500	S.	Sandy loam	1903	16	Apr. 2	Apr. 6							Mar.
19	do	37	15	2,170	NW.	Limestone clay	1902	13	Apr. 28	May 3	Apr. 18	Apr. 11		Sept. 25	Sept. 14		
11	do	37	25	1,400	NW.	Gravelly clay	1902	6	Apr. 21	Apr. 24	Apr. 8	Apr. 21	July	do			Mar.
24	do	37	45	1,000	SW.	Clay loam	1904	12	Apr. 24		Apr —	Apr. 10	June 15				
22	do	37	50	800	SE.	do	1903	20	Mar. 24	Apr. 15	Apr. 15	Apr. 25		Sept. 15			June.
27	do	37	55	200	E. & W.	Sandy loam	1903	16	Mar. 30	Apr. 4		Apr. 5		Oct. —			
27	do	37	55	200	E. & W.	do	1904	17	Apr. 20	Apr. 25	Apr. 6	Apr. 25		Nov. 1	Sept. 7		Mar.
21	do	38	0	1,300	N.	Black loam	1903	19			Apr. 5	Mar. 26		Oct. 2	Oct. 15		Dec.
29	do	38	25	1,350	W.	Gravelly clay	1902	16	Apr. 26	May 1		Apr. 15		Oct. 1			Mar.
29	do	38	25	1,350	W.	do	1903	17	Apr. 13	Apr. 22		Apr. 10		Oct. —			Feb.
14	do	38	30	400	NE.	Clay loam	1902	15	Apr. 24	Apr. 27	Apr. 15	Apr. 15	Aug. 20	Oct. 15	Oct. 22		Mar.
14	do	38	30	400	NE.	do	1903	16	Apr. 12	Apr. 22	Apr. 5	Apr. 2	Aug. 4	Oct. 1	Oct. 18		Do.
14	do	38	30	400	NE.	do	1904	17	Apr. 30	May 6	Apr 23	Apr. 8	July 29	Sept. 26	Sept. 23		Do.
26	do	38	45	375	SE.	Sandy loam	1903	15	Apr. 8	May 12	Apr. 5	Apr. 15	July 1	Sept. 15	Oct. 25		May.
30	do	38	55	1,000	NE.	do	1902	14	Apr. 24	Apr. 28	Apr. 14	Apr. 18	June 15	Sept. 25			Mar.
30	do	38	55	1,000	NE.	do	1903	15	Apr. 10	Apr. 22	Apr. 5	Apr. 2	June 10	Sept. 30			June.
30	do	38	55	1,000	NE.	do	1904	16	May 4	May 10	Apr. 20	Apr. 27	do	do			May.

Phenological Records—Pears.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
	ANGOULEME.														
53	Georgia	33 40	1,000	N.	Sandy loam	1903	2	Mar. 12	Mar. 16	May 2					
56	do	34 15	700	SE.	Clay loam	1904	15	Mar. 23	Mar. 26						
34	North Carolina	35 5	125	None.	Sandy	1904		do	Mar. 27						
38	do	35 25	2,200	NW.	Porous loam	1903	14	Mar. 28	Apr. 4	Apr. 6	Apr. 6				
12	Virginia	37 0	5	SW.	Sandy loam	1904	8	Apr. 9	Apr. 13	Apr. 20	Apr. 3	June 23	Sept. 15	Oct. 17	
4	do	37 15	1,000	N.	do	1903	5	Mar. 25	Apr. 3						
15	do	37 20	10	None.	Clay loam	1903	24	Mar. 21	Mar. 27		Mar. 27				
15	do	37 20	10	None.	do	1904	25	Apr. 9	Apr. 12		Apr. 9		Sept. 6	Oct. 16	
27	do	37 55	200	W.	Sandy loam	1903	15	Mar. 24	Apr. 1		Apr. 5		Sept. 1		
27	do	37 55	200	W.	do	1904	16	Apr. 12	Apr. 22	Apr. 6	Apr. 25		Sept. 10	Sept. 7	
26	do	38 45	350	S. & E.	do	1903	15	Apr. 2	Apr. 6	Apr. 5		July 11		Oct. 25	
	ANJOU.														
		° ′													
19	Virginia	37 15	2,170	NW.	Limestone clay	1903	14	Apr. 7	Apr. 14	Apr. 5	Mar. 27			Sept. 14	
19	do	37 15	2,170	NW.	do	1904	15	Apr. 26	May 1	May 16	Apr. 18			Oct. 15	
27	do	37 55	200	W.	Sandy loam	1903	15	Mar. 24	Apr. 1		Apr. 5		Sept. 1		
27	do	37 55	200	W.	do	1904	16	Apr. 12	Apr. 22	Apr. 6	Apr. 25		Sept. 10	Sept. 7	
	BARTLETT.														
		° ′													
56	Georgia	34 15	700	SE.	Clay loam	1904	15	Mar. 23	Mar. 26						
49	South Carolina	34 50	1,000	S.	Cecil clay	1904	6	Mar. 16	Apr. 1	Mar. 16	Mar. 19	July 28	Sept. 10	Nov. 14	Oct.
38	North Carolina	35 25	2,200	NW.	Porous loam	1903	13	Apr. 1	Apr. 8	Apr. 6	Apr. 10				
38	do	35 25	2,200	NW.	do	1904	14	Apr. 10	Apr. 16	Apr. 11	Apr. 18	Aug. 12	Sept. 15	Oct. 15	Oct.
19	Virginia	37 15	2,170	NW.	Limestone clay	1903	14	Apr. 6	Apr. 12	Apr. 5	Apr. 7			Sept. 14	
19	do	37 15	2,170	NW.	do	1904	15	Apr. 27	May 1	May 16	Apr. 24			Oct. 15	
15	do	37 20	10	None.	Clay loam	1903	19	Mar. 28	Apr. 2						
15	do	37 20	10	None.	do	1904	20	Apr. 16	Apr. 20		Apr. 18		Aug. 1	Oct. 16	Aug.
27	do	37 55	200	E. & W.	Sandy loam	1903	15	Mar. 24	Apr. 1		Apr. 5		Aug. 15		
27	do	37 55	200	E. & W.	do	1904	16	Apr. 12	Apr. 22	Apr. 6	Apr. 25		Aug. 25	Sept. 7	

14	.....do..	38	30	400	NE.	Clay loam	1902	7	Apr. 16	Apr. 20	Apr. 15	Apr. 12	Aug. 23	Aug. 19	Oct. 22	Aug.
14	.....do..	38	30	400	NE.	....do	1903	8	Apr. 1	Apr. 24	Apr. 5	Mar. 26	Aug. 7	Sept. 20	Oct. 18	Sept.
14	.....do	38	30	400	NE.	....do	1904	9	Apr. 23	May 1	Apr. 23	Apr. 8	July 17	Sept. 6	Sept. 23	Do.
26	.....do	38	45	350	S. & E.	Sandy loam	1903	12	Apr. 4	Apr. 7			July 4		Oct. 25	
						CLAIRGEAU.										
		°	′													
19	Virginia	37	15	2,170	NW.		1903	14	Apr 9	Apr. 14	Apr. 5	Apr. 9			Sept. 14	
19	.....do	37	15	2,170	NW.		1904	15	Apr. 28	May 2	May 16	Apr. 18			Oct. 15	
						EARLY HARVEST.										
		°	′													
14	Virginia	38	30	400	NE.	Clay loam	1902	3	Apr. 22	Apr. 24	Apr. 15	Apr. 19	Aug. 23		Oct. 22	
14	.....do	38	30	400	NE.	.....do	1904	5	....do	Apr. 30	Apr. 23	Apr. 9	July 11	July 29	Sept. 23	
						GARBER.										
		°	′													
49	South Carolina	34	50	1,000	S.	Cecil clay	1903	5	Mar. 21	Apr. 4	Mar. 10	Mar. 13	Aug. 11	Sept. 15	Oct. 25	
49	.....do	34	50	1,000	S.	....do	1904	6	Mar. 24	Mar. 31	Mar. 16	Mar. 21	July 30	Oct. 15	Nov. 14	
						KIEFFER.										
		°	′													
60	Georgia	31	40	450	N.	Sandy loam	1903	7	Mar. 2	Mar. 8	Feb. 17	Mar. 3		Oct. 15	Nov. 14	
56	.....do	34	15	700	SE.	Clay loam	1904	15	Mar. 17	Mar. 22		Mar. 26				
59	.....do	34	30	1,600	N.	.....do	1904	8	Mar. 20	Mar. 25	Apr. 10	Apr. 1			Nov. 10	Mar.
48	South Carolina	34	45	1,200	S.	Cecil clay	1904	6	Apr. 1	Apr. 10	Apr. 4	Mar. 25			Nov. —	
49	.....do	34	50	1,000	S.	.....do	1903	5	Mar. 16	Apr. 2	Mar. 10	Mar. 13	Aug. 8	Oct. 15	Oct. 25	
49	.....do	34	50	1,000	S.	.....do	1904	6	Mar. 25	Apr. 1	Mar. 16	Mar. 21	July 30	Nov. 12	Nov. 14	Jan.
51	.....do	34	55	700	SW.	Clay loam	1902	4	Apr. 15	May 8		May 8		Aug. 20	Oct. 16	Oct.
36	North Carolina	35	30	2,850	SW.	.....do	1904	7	Apr. 5	Apr. 15	Apr. 1	Apr. 20	July 3	Oct. 1	....do	Dec.
12	Virginia	37	0	5	SW.	Sandy loam	1903	7	Apr. 20	Apr. 25	Apr. 5	Apr. 22			Oct. 27	
12	.....do	37	0	5	SW.	.....do	1903	8	Apr. 2	Apr. 16	Apr. 20	Mar. 28	June 23		Oct. 17	
19	.....do	37	15	2,170	W.	Limestone clay	1903	14	Apr. 10	Apr. 15	Apr. 5	Mar. 24			Sept. 14	
19	.....do	37	15	2,170	W.	.....do	1904	15	Apr. 22	Apr. 28	May 16	Apr. 16			Oct. 15	
4	.....do	37	15	1,000	N.	Sandy loam	1903	7	Mar. 21	Mar. 30			July 1	Sept. 25		Dec.
27	.....do	37	55	200	W.	.....do	1903	5	Mar. 24	Apr. 1		Apr. 5		Oct. 5		
27	.....do	37	55	200	W.	.....do	1904	6	Apr. 10	Apr. 15	Apr. 6	Apr. 20		Oct. 15	Sept. 7	Dec.
14	.....do	38	30	400	NE.	Clay loam	1902	4	Apr. 15	Apr. 20	Apr. 15	Apr. 7	Aug. 27	Sept. 26	Oct. 22	Oct.
14	.....do	38	30	400	NE.	.....do	1903	5	Mar. 30	Apr. 2	Apr. 5		Aug. 11	Oct. 1	Oct. 18	Do.
14	.....do	38	30	400	NE.	.....do	1904	6	Apr. 19	Apr. 26	Apr. 23	Apr. 28	July 23	Sept. 28	Sept. 23	Do.
26	.....do	38	45	350	S. & E.	Sandy loam	1903	8	Mar. 27	Apr. 1	Apr. 5		July 2		Oct. 25	

Phenological records—Pears—Continued.

LE CONTE.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
56	Georgia	34 15	700	SE.	Clay loam	1904	15	Mar. 18	Mar. 23		Mar. 26				
49	South Carolina	34 50	1,000	S.	Cecil clay	1903	5	Mar. 22	Apr. 4	Apr. 10	Mar. 18	Aug. 10		Oct. 25	
49	do	34 50	1,000	S.	do	1904	6	Mar. 26	do	Apr. 16	Mar. 19	July 28	Sept. 1	Nov. 14	Sept.
34	North Carolina	35 5	125	None.	Sandy loam	1904		Mar. 19	Mar. 24						
12	Virginia	37 0	5	SW.	do	1903	7	Mar. 20	Mar. 25	Apr. 5	Mar. 22			Oct. 27	
12	do	37 0	5	SW.	do	1904	8	Apr. 1	Apr. 10	Apr. 20	Mar. 28	July 9	Aug. 18	Oct. 17	
15	do	37 20	10	None.	Clay loam	1903	14	Mar. 19	Mar. 23		Mar. 20				
15	do	37 20	10	None.	do	1904	15	Apr. 6	Apr. 10		Apr. 4		Sept. 1	Oct. 16	
24	do	37 45	1,000	SW.	do	1904	13	Apr. 7	Apr. 15	Apr. —	Mar. 28	June 15	Aug. 28		
14	do	38 30	400	NE.	do	1902	4	Apr. 13	Apr. 19	Apr. 15	Apr. 6	Aug. 27	Sept. 20	Oct. 22	Oct.
14	do	38 30	400	NE.	do	1903	5	Mar. 27	Mar. 31	Apr. 5	Mar. 20	Aug. 11	Sept. 17	Oct. 18	Sept.
14	do	38 30	400	NE.	do	1904	6	Apr. 18	Apr. 26	Apr. 23	Mar. 6	July 24	Sept. 1	Sept. 23	Do.
26	do	38 45	350	S. & E.	Sandy loam	1903	8	Mar. 28	Apr. 2	Apr. 5		July 2		Oct. 25	

SECKEL.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
38	North Carolina	35 25	2,200	NW.	Porous loam	1903	12	Apr. 2	Apr. 8	Apr. 6	Apr. 8				
36	do	35 30	2,850	SW.	Clay loam	1904	7	Apr. 6	Apr. 16	Apr. 1	Apr. 20	July 4	Oct. 1	Oct. 16	Oct.
12	Virginia	37 0	5	SW.	Sandy loam	1904	8	Apr. 13	Apr. 25	Apr. 20	Apr. 5	June 23	Sept. 1	Oct. 17	
19	do	37 15	2,170	W.	Limestone clay	1903	14	Apr. 8	Apr. 14	Apr. 5	Apr. 6			Sept. 14	
19	do	37 15	2,170	W.	do	1904	15	Apr. 29	May 2	May 16	Apr. 20			Oct. 15	
4	do	37 15	1,000	N.	Sandy loam	1903	7	Mar. 30	Apr. 8			June 15	Aug. 28		Sept.
27	do	37 55	200	W.	do	1903	15	Mar. 24	Apr. 1		Apr. 5		Sept. 1		
27	do	37 55	200	W.	do	1904	16	Apr. 15	Apr. 20	Apr. 6	Apr. 25		Sept. 10	Sept. 7	
14	do	38 30	400	NE.	Clay loam	1902	2			Apr. 15	Apr. 15	Aug. 25		Oct. 22	
14	do	38 30	400	NE.	do	1903	3	Apr. 2	Apr. 5	Apr. 5	Mar. 28	Aug. 15		Oct. 18	
14	do	38 30	400	NE.	do	1904	4	Apr. 28	May 6	Apr. 23	Apr. 12	Aug. 8		Sept. 23	
26	do	38 45	350	S. & E.	Sandy loam	1903	5	Apr. 4	Apr. 7	Apr. 5		July 4		Oct. 25	

SHELDON.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Keeps until—
		° ′													
12	Virginia	37 0	5	SW.	Sandy loam	1904	8	Apr. 12	Apr. 18	Apr. 20	Apr. 6	June 23		Oct. 17	
19	do	37 15	2,170	W.	Limestone clay	1903	15	Apr. 11	Apr. 14	Apr. 5	Apr. 10			Sept. 14	

Phenological Records—Peaches.

ALEXANDER.

Observer's number.	State.	Approximate latitude.		Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first picking.	Date last picking.	Date first fall frost.
		°	′													
62	Georgia	32	5	450	S.	Light loam	1902	6	Mar. 22	Mar. 26	Feb. 27	Apr. 2		May 22	June 7	Nov. 20
62	do	32	5	450	S.	do	1903	7	Mar. 14	Mar. 20	Feb. 17	do	May 22	June 8	June 10	Nov. 10
45	South Carolina	33	25	350	E.	Sandy	1903	3	Mar. 12	Mar. 18	Mar. 11		July 15	May 18	do	Oct. 24
45	do	33	25	350	E.	do	1904	4	Mar. 14	Mar. 20	Mar. 5		June 20	May 16	June 9	Oct. 16
50	do	34	0	500	None.	Sandy loam	1902	9	Mar. 20	Mar. 27	Mar. 19	Mar. 28		May 28	June 4	
54	Georgia	34	0	700	S.	Cecil clay	1904	6	Mar. 19	do	Apr. 5	Mar. 12	Aug. 10	June 15	June 20	Oct. 22
40	North Carolina	34	15	10	S.	Sandy loam	1902	8	Mar. 1	Mar. 10	Apr. 3	Apr. 11				Nov. 24
40	do	34	15	10	S.	do	1903	9	Feb. 26	Mar. 7	Feb. 22	Mar. 20	Aug. 24	June 20		Oct. 28
58	Georgia	34	40	1,300	N.	Clay loam	1904	6	Mar. 20	Mar. 27	Apr. 4	Apr. 1		do	July 1	
47	South Carolina	34	40	850		do	1902	12	Mar. 31	Apr. 7	Mar. 21			June 18	June 25	Nov. 27
49	do	34	50	1,000	E.	Cecil clay	1902	3	Mar. 27	Apr. 5	Mar. 20	Apr. 2	Aug. 17	June 5	June 10	Nov. 28
49	do	34	50	1,000	E.	do	1903	4	Mar. 13	Mar. 19	Mar. 10	Mar. 14	Aug. 8	June 10	June 20	Oct. 25
49	do	34	50	1,000	E.	do	1904	5	Mar. 25	Apr. 2	Apr. 26	Mar. 21	July 29	June 20	July 1	Nov. 14
51	do	34	55	700	S. & E.	do	1902	4	Mar. 12	Apr. 12		Apr. 9		June 26	July 8	
38	North Carolina	35	25	2,128	W.	Porous loam	1902	8	Apr. 12	Apr. 19	Apr. 5	Apr. 21	July 8	June 27	July 5	Oct. 15
38	do	35	25	2,128	W.	do	1903	9	Mar. 27	Apr. 2	Apr. 6	Apr. 8				
38	do	35	25	2,128	W.	do	1904	10	Apr. 9	Apr. 14	Apr. 11	Apr. 16	July 10			Do.
32	do	35	30	2,800	E.	Black loam	1904	8	Apr. 4	Apr. 17	Apr. 20	Apr. 5	Aug. 20	July 1	July 10	Oct. 14
31	do	35	35	2,300	S.	Red clay	1902	4	Apr. 7	Apr. 15	Apr. 18	Apr. 20	June 20	June 28	July 5	Oct. 15
31	do	35	35	2,300	S.	do	1904	6	Apr. 6		Apr. 20	Apr. 16				Do.
42	do	36	10	3,250	S.	Black loam	1904	2	Apr. 25	Apr. 28	Apr. 21	May 3	July 23			Do.
4	Virginia	37	5	1,000	None.	Sandy loam	1902	3	Apr. 3	Apr. 9						
4	do	37	5	1,000	None.	do	1903	4	Mar. 25	Apr. 2				June 20	June 24	
5	do	37	25	1,000	N. & W.	Cecil clay	1903	3	Mar. 20	Mar. 30	Apr. 5				July 6	Oct. 30
27	do	37	55	200	S.	Sandy loam	1902	4	Apr. 10	Apr. 18	Apr. 9	Apr. 25		July 1	July 15	Do.
2	do	38	5	900	None.	Cecil clay	1902	10	Apr. 6	Apr. 15	Apr. 3	Apr. 6		June 26	June 30	Oct. —
2	do	38	5	900	None.	do	1902	3	Apr. 10	Apr. 13	do	Apr. 10				Do.
16	do	38	15	400	NE.	Sandy	1902	5	Apr. 4	Apr. 8	May 3	Apr. 18				Oct. 17
17	do	38	15	150	S.	Sandy loam	1902		Apr. 2	Apr. 14	Mar. 18	Apr. 12				
26	do	38	45	325	S. & E.	Loam	1903	10	Mar. 28	Mar. 31	Apr. 5			June 20	July 1	Oct. 25

Phenological records—Peaches—Continued.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds began to open.	Date terminal buds begin to form.	Date first picking.	Date last picking.	Date first fall frost.
					AMSDEN.										
		° ′													
49	South Carolina	34 50	1,000	E.	Cecil clay	1902	10	Mar. 25	Apr. 5	Mar. 20	Mar. 29	Aug. 25	June 15	June 20	Nov. 28
49	do	34 50	1,000	E.	do	1903	12	do	Apr. 2	Apr. 26	Mar. 21	July 30	June 20	July 1	Nov. 14
38	North Carolina	35 25	2,128	None.	Porous loam	1902	6	Apr. 10	Apr. 17	Apr. 5	Apr. 21	July 6	June 22	June 30	Oct. 15
30	Virginia	38 55	800	N. & E.	do	1902	2	Apr. 15	Apr. 19	Apr. 14	Apr. 18				
					BILYEU.										
		° ′													
50	South Carolina	34 0	500	None.	Sandy loam	1902	3	Mar. 19	Mar. 28	Mar. 19	Mar. 22				
47	do	34 40	850		Porous clay	1902	12	Mar. 28	Apr. 8	Mar. 21					Nov 27
49	do	34 50	1,000	E.	Cecil clay	1902	3	Mar. 27	Apr. 6	Mar. 20	Apr. 1	Aug. 18	Oct. 1	Oct. 6	Nov. 28
49	do	34 50	1,000	E.	do	1904	5	Mar. 22	Mar. 31	Apr. 26	Mar. 21	July 30	Oct. 25	Nov. 15	Nov. 14
32	North Carolina	35 30	2,800	E.	Black loam	1904	8	Apr. 1	Apr. 7	Apr. 20	Apr. 2	Aug. 12	Sept. 28	Oct. 5	Oct. 14
5	Virginia	37 25	1,000	N. & W.	Cecil clay	1903	7	Mar. 23	Mar. 30	Apr. 5	Mar. 28				Oct. 30
16	do	38 15	400	NE.	Sandy	1902	7	Apr. 10	Apr. 13	May 3	Apr. 20				Oct. 17
					CARMAN.										
		° ′													
50	South Carolina	34 0	500	None.	Sandy loam	1902	3	Mar. 19	Mar. 28	Mar. 19	Mar. 22				
49	do	34 50	1,000	E.	Cecil clay	1903	4	Mar. 12	Mar. 19	Mar. 10	Mar. 19	Aug. 14	June 25	July 14	Oct. 25
49	do	34 50	1,000	E.	do	1904	5	Mar. 22	Mar. 30	Apr. 26	Mar. 21	July 21	July 1	July 15	Nov. 11
2	Virginia	38 5	900	None.	do	1902	3	Apr. 3	Apr. 11	Apr. 3	Apr. 3				Oct. —
					CHAMPION.										
		° ′													
50	South Carolina	34 0	500	None.	Sandy loam	1902	....	Mar. 17	Mar. 21	Mar. 19	Mar. 21				
11	Virginia	37 25	1,400	NW.	Porous clay	1902	5	Apr. 16	Apr. 19	Apr. 8	Apr. 21	July —	Aug. 15	Aug. 30	

CHINESE CLING.

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62	Georgia	32	5	450	S.	Sandy	1902	7	Mar. 15	Mar. 18	Feb. 27	Apr. 3	.....	July 10	July 18	Nov. 20
62	....do	32	5	450	S.	....do	1903	8	Mar. 6	Mar. 12	Feb. 17	Apr. 2	June 1	July 6	....do	Nov. 10
44	South Carolina	33	30	500	W. & N.	Light sandy	1902	5	Mar. 15	Mar. 21	Mar. 25	.....	.....	.....	.....	
50	....do	34	0	500	None.	Sandy loam	1902	9	Mar. 18	Mar. 23	Mar. 19	Mar. 23	.....	.....	.....	
40	North Carolina	34	15	10	S.	....do	1903	5	Mar. 8	Mar. 20	Feb. 22	Apr. 2	Sept. 1	July 15	.....	Oct. 28
57	Georgia	34	25	900	SE.	....do	1903	8	....do	Mar. 15	.....	Mar. 23	.....	.....	.....	
47	South Carolina	34	40	850	.....	Light clay	1902	12	Mar. 24	Mar. 31	Mar. 21	.....	.....	July 20	Aug. 8	Nov. 27
49	....do	34	50	1,000	E.	Cecil clay	1902	10	Mar. 27	Apr. 3	Mar. 20	Mar. 26	Aug. 20	....do	Aug. 1	Nov. 28
49	....do	34	50	1,000	E.	....do	1903	11	Mar. 11	Mar. 18	Mar. 10	Mar. 14	Aug. 14	July 25	Aug. 15	Oct. 25
49	....do	34	50	1,000	E.	....do	1904	12	Mar. 21	Mar. 30	Apr. 26	Mar. 19	July 28	July 28	....do	Nov. 14
32	North Carolina	35	30	2,800	E.	Black loam	1904	8	Apr. 4	Apr. 12	Apr. 20	Apr. 7	Aug. 15	Aug. 12	Aug. 17	Oct. 14
31	....do	35	35	2,300	S.	Red clay	1902	5	Apr. 11	Apr. 18	Apr. 18	Apr. 22	June 25	Aug. 25	Sept. 15	Oct. 15
31	....do	35	35	2,300	S.	....do	1904	7	Apr. 6	.....	Apr. 20	Apr. 10	.....	.....	.....	Do.
4	Virginia	37	15	1,000	None.	Sandy loam	1903	5	Mar. 25	Apr. 1	.....	.....	.....	Aug. 5	Aug. 9	

CONNETT.

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49	South Carolina	34	50	1,000	E.	Cecil clay	1902	3	Mar. 25	Apr. 2	Mar. 20	Mar. 31	Aug. 20	June 15	June 25	Nov. 28
49	....do	34	50	1,000	E.	....do	1903	4	Mar. 14	Mar. 21	Mar. 10	Mar. 14	Aug. 14	June 25	July 5	Oct. 25
49	....do	34	50	1,000	E.	....do	1904	5	Mar. 23	Mar. 31	Apr. 26	Mar. 19	Aug. 25	July 1	July 15	Nov. 14
28	Virginia	37	20	1,200	W.	Light clay	1902	4	Apr 6	Apr. 18	.....	Apr. 16	.....	.....	.....	
9	....do	37	25	1,100	SE.	Red clay	1902	....	Apr. 8	....do	Mar. 15	.....	.....	.....	.....	
14	....do	38	30	400	N.	....do	1902	5	Apr. 13	Apr. 20	Apr. 15	Apr. 15	Aug. 22	July 16	July 28	Oct. 22
14	....do	38	30	400	N.	....do	1903	6	.....	Mar. 31	Apr. 5	.....	Aug. 12	July 6	July 22	Oct. 18
14	....do	38	30	400	N.	....do	1904	7	Apr. 15	Apr. 21	Apr. 23	Apr. 10	July 17	.....	.....	Sept. 23

CROSBY.

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36	North Carolina	35	30	2,850	NW.	Clay loam	1902	5	Mar. 29	Apr. 7	Mar. 25	Apr. 20	July 29	Aug. 25	Sept. 5	Oct. 10
12	Virginia	37	0	5	SW.	Sandy loam	1903	7	Mar. 22	Mar. 25	Apr. 5	Mar. 25	.....	.....	.....	Oct. 27
12	....do	37	0	5	SW.	....do	1904	8	Apr. 5	Apr. 10	Apr. 20	Apr. 3	Aug. 10	July 20	.....	Oct. 17
5	....do	37	25	1,000	N. & W.	Cecil clay	1903	7	Mar. 23	Mar. 30	Apr. 5	Mar. 28	.....	.....	Aug. 20	Oct. 30
5	....do	37	25	1,000	N. & W.	....do	1904	8	Apr. 8	Apr. 16	Apr. 22	.....	.....	.....	.....	

Phenological records—Peaches—Continued.

EARLY CRAWFORD.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first picking.	Date last picking.	Date first fall frost.
		° ′													
63	Georgia	31 40	450	N.	Sandy loam	1902	5	Mar. 9	Mar. 20	Mar. 19	Mar. 11		July 10	July 28	Nov. 28
62	do	32 5	450	S.	do	1902	4	Mar. 18	Mar. 21	Feb. 27	Mar. 28	May 20	June 30	July 3	Nov. 20
62	do	32 5	450	S.	do	1903	5	Mar. 14	Mar. 20	Feb. 17	Apr. 1			July 10	Nov. 10
45	South Carolina	33 25	350	E.	Sandy	1903	6	Mar. 10	Mar. 18	Mar. 11		July 8	July 5	July 20	Oct. 24
45	do	33 25	350	E.	do	1904	7	Mar. 8	do	Apr. 5		June 20	July 7	July 24	Oct. 16
44	do	33 30	500	W. & N.	do	1902	8	Mar. 15	Mar. 21		Mar. 24				
61	Georgia	34 5	1,540	None.	Clay loam	1902	3	Mar. 22	Apr. 2				July 12	July 30	
47	South Carolina	34 40	850		Porous clay	1902	12	Mar. 25	Apr. 4	Mar. 21			Aug. 2	Aug. 23	Nov. 2
41	North Carolina	35 15	1,700	E.	Black loam	1902	7	Mar. 26	Apr. 2	Mar. 19	Apr. 3				Dec. —
41	do	35 15	1,700	E.	do	1903	8	Mar. 13	Mar. 23	Feb. —					
38	do	35 25	2,128	W.	Porous loam	1902	8	Apr. 10	Apr. 17	Apr. 5	Apr. 20	July 10	Aug. 8	Aug. 12	Oct. 15
38	do	35 25	2,128	W.	do	1903	9	Mar. 26	Apr. 2	Apr. 6					
38	do	35 25	2,128	W.	do	1904	10	Apr. 8	Apr. 14	Apr. 11	Apr. 16	July 14			Do.
36	do	35 30	2,850	NW.	Clay loam	1902	5	Mar. 31	Apr. 6	Mar. 25	Apr. 17	July 25	Aug. 20	Sept. 1	Oct. 10
36	do	35 30	2,850	NW.	do	1903	6	Mar. 15	Mar. 24	Apr. 28	Mar. 20	July 10			Oct. 15
36	do	35 30	2,850	NW.	do	1904	7	Mar. 22	Mar. 25	Apr. 1	Apr. 4	June 20	Aug. 20	Aug. 30	Oct. 16
32	do	35 30	2,800	E.	Black loam	1904	8	Apr. 1	Apr. 11	Apr. 20	do	Aug. 15	Aug. 5	Aug. 12	Oct. 14
31	do	35 35	2,300	S.	Red clay	1902	5	Apr. 11	Apr. 19	Apr. 18	Apr. 21	June 25	do	Aug. 10	Oct. 15
31	do	35 35	2,300	S.	do	1904	7	Apr. 3		Apr. 20	Apr. 10	July 1			Do.
42	do	36 10	3,250	S.	Black loam	1904	2	Apr. 24	Apr. 27	Apr. 21	May 5	Aug. 4	Aug. 7	Aug. 8	Do.
12	Virginia	37 0	5	SW.	Sandy loam	1903	7	Mar. 22	Mar. 25	Apr. 5	Mar. 25	July 24	July 24	July 30	Oct. 27
12	do	37 0	5	SW.	do	1904	8	Apr. 3	Apr. 10	Apr. 20	Apr. 4	Aug. 2	July 28	Aug. 15	Oct. 17
11	do	37 25	1,400	NW.	Porous clay	1902	5	Apr. 17	Apr. 19	Apr. 8	Apr. 19	July —	Aug. 1	do	
27	do	37 55	200	S.	Sandy loam	1902	15	Apr. 10	Apr. 18	Apr. 9	Apr. 25		do	Aug. 25	Oct. 30
27	do	37 55	200	S.	Sandy loam	1903	16	Mar. 24	Apr. 1				Aug. 1	Aug. 20	
27	do	37 55	200	S.	do	1904	17	Apr. 15	Apr. 23	Apr. 6	Apr. 20		Aug. 5	Aug. 25	Sept. 7
16	do	38 15	400	NE.	do	1902	5	Apr. 4	Apr. 8	May 3	Apr. 17				Oct. 17
14	do	38 30	400	N.	Red clay	1903	13		Mar. 24	Apr. 5		July 29		Aug. 16	Oct. 18
26	do	38 45	325	S. & E.	Loam	1903	9	Mar. 26	Mar. 30	do	Apr. 10		Aug. 1	Aug. 5	Oct. 25
30	do	38 55	800	N. & E.	Porous loam	1902	4	Apr. 15	Apr. 19	Apr. 14	Apr. 18				

ELBERTA.

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60	Georgia	31	25	500	E. & W.	Sandy loam	1902	5	Mar. 3	Mar. 10	Mar. 11	Mar. 13	July 22	July 4	July 23	Nov. 1
60	do	31	25	500	E. & W.	do	1903	6	Mar. 5	Mar. 12	Feb. 12	Mar. 10	July 15	June 29	July 3	Nov. 19
60	do	31	25	500	E. & W.	do	1904	7	Feb. 26	Mar. 2	Feb. 13	Mar. 1	July 1	June 27	July 9	Oct. 22
63	do	31	40	450	N.	do	1902	5	Mar. 3	Mar. 16	Mar. 19	Mar. 5		July 5	July 24	Nov. 28
63	do	31	40	450	N.	do	1903	6	do	Mar. 15	Feb. 17					Nov. 14
62	do	32	5	450	S.	do	1902	8	Mar. 14	Mar. 18	Feb. 27	Mar. 23		July 9	July 23	Nov. 20
62	do	32	5	450	S.	do	1903	9	Mar. 7	Mar. 15	Feb. 17	Mar. 20	May 22	July 1	do	Nov. 10
45	South Carolina	33	20	350	E.	Sandy	1902	4						July 20	July 28	Nov. 28
45	do	33	20	350	E.	do	1903	5	Mar. 10	Mar 20	Mar. 11		July 10	July 4	July 25	Oct. 24
45	do	33	20	350	E.	do	1904	6	do	Mar. 17	Feb. 5		June 20	July 11	July 26	Oct. 16
44	do	33	30	500	W. & N.	do	1902	8	Mar. 17	Mar. 22		Mar. 26				
53	Georgia	33	40	1,000	W.	Clay loam	1903	4	Mar. 10	Mar. 18	Mar. 2					
50	South Carolina	34	0	500	None.	Sandy loam	1902	9	Mar. 16	Mar. 21	Mar. 19	Mar. 22		July 10	July 27	
54	Georgia	34	0	700	S.	Cecil clay	1904	8	Mar. 10	Mar. 19	Apr. 5	Apr. 4	Aug. 8	July 22	Aug. 8	Oct. 22
61	do	34	5	1,540	None.	Clay loam	1902	3	Mar. 22	Mar. 27				July 15	Aug. 6	
40	North Carolina	34	15	10	S.	Sandy loam	1903	3	Feb. 28	Mar. 10	Feb. 22	Mar. 20	Aug. 28	July 8		Oct. 28
52	Georgia	34	20	1,100		Cecil clay	1904	7	Mar. 17	Mar. 25	Apr. 4	Mar. 14	Aug. 1	July 23	Aug. 3	Nov. 15
57	do	34	25	900	SE.	Sandy loam	1903	8	Mar. 9	Mar. 16		Mar. 22		July 22	Aug. 1	
59	do	34	30	1,600	None.	do	1904	6	Mar. 20	Mar. 25	Apr. 12	Mar. 20	June 20	Aug. 10	Aug. 20	
58	do	34	40	1,300	N.	Cecil clay	1904		Mar. 13	Mar. 21	Apr. 11	Apr. 27		July 15	Aug. 1	
47	South Carolina	34	40	850		Porous clay	1902	12	Mar. 24	Mar. 29	Mar. 21			July 30	Aug. 12	Nov. 27
46	do	34	40	900	W.	Cecil clay	1902	4	Mar. 3	Mar. 20		Mar. 27	June 30	Aug. 1	Aug. 15	
49	do	34	50	1,000	E.	do	1902	10	Mar. 22	Mar. 31	Mar. 20	Mar. 26	Aug. 24	July 20	Aug. 5	Nov. 28
49	do	34	50	1,000	E.	do	1903	11	Mar. 11	Mar. 18	Mar. 10	Mar. 14	Aug. 16	July 25	Aug. 15	Oct. 25
49	do	34	50	1,000	E.	do	1904	12	Mar. 18	Mar. 26	Apr. 26	Mar. 17	July 26	July 28	do	Nov. 14
51	do	34	55	700	S. & E.	do	1902	4	Mar. 16	Apr. 10		Apr. 14		July 6	Aug. 28	
41	North Carolina	35	15	1,700	E.	Black loam	1902	3	Mar. 22	Mar. 27	Mar. 19	Mar. 26				
35	do	35	30	2,700	N.	do	1904	12	Mar. 25	Apr. 1		Apr. 8		July 20		
31	do	35	35	2,300	E.	do	1902	4	Apr. 5	Apr. 15	Apr. 18	Apr. 18	June 25	Aug. 15	Aug. 20	Oct. 15
31	do	35	35	2,300	E.	do	1904	6	Apr. 1	Apr. 8	Apr. 20					Do.
42	do	36	10	3,250	S.	do	1904	2	Apr. 24	Apr. 26	Apr. 21	May 1	July 30	July 25		Do.
12	Virginia	37	0	5	SW.	Sandy loam	1903	7	Mar. 20	Mar. 24	Apr. 5	Mar. 22	July 24	July 29	July 30	Oct. 27
12	do	37	0	5	SW.	do	1904	8	Apr. 2	Apr. 10	Apr. 20	Apr. 1	Aug. 12	Aug. 6		Oct. 17
4	do	37	15	1,000	None.	do	1902	4	Apr. 1	Apr. 7				Aug. 25	Aug. 29	
4	do	37	15	1,000	None.	do	1903	5	Mar. 21	Mar. 27				July 5	July 10	
28	do	37	20	1,200	N. & W.	Porous clay	1902	4	Apr. 6	Apr. 20		Apr. 12				
5	do	37	25	1,000	N. & W.	Cecil clay	1903	7	Mar. 21	Mar. 30	Apr. 5	Apr. 28				Oct. 30
5	do	37	25	1,000	N. & W.	do	1904	8	Apr. 7	Apr. 15	Apr. 22					
11	do	37	25	1,400	NW.	Porous clay	1902	5	Apr. 19	Apr. 24	Apr. 8	Apr. 22	July	Aug. 15	Aug. 30	
2	do	38	5	900	None.	Cecil clay	1902	9	Apr. 1	Apr. 7	Apr. 3	Apr. 1		Aug. 11	Aug. 15	Oct. —
17	do	38	15	150	S.	Sandy loam			Mar. 31	Apr. 12	Mar. 18	Apr. 7				
29	do	38	25	1,500	N. & W.	Porous clay	1902	4	Apr. 12	Apr. 20		Apr. 10		Aug. 18	Sept. 1	
14	do	38	30	400	N.	Red clay	1902	4	Apr. 10	Apr. 17	Apr. 15	Apr. 11	Aug. 27			Oct. 22
14	do	38	30	400	N.	do	1903	5		Mar. 30	Apr. 5		Aug. 15	Aug. 12	Aug. 26	Oct. 18
14	do	38	30	400	N.	do	1904	6	Apr. 15	Apr. 19	Apr. 23	Apr. 10	July 15	Aug. 28	Sept. 11	Sept. 23
26	do	38	45	325	S. & E.	Loam	1903	3	Mar. 23	Mar. 27	Apr. 5	do		Aug. 5	Aug. 16	Oct. 25
30	do	38	55	800	N. & E.	Porous loam	1902	2	Apr. 12	Apr. 16	Apr. 14	Apr. 16		Aug. 15	Aug. 25	

Phenological records—Peaches—Continued.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first picking.	Date last picking.	Date first fall frost.
					GLOBE.										
		° ′													
61	Georgia	34 5	1,540	None.	Clay loam	1902	3	Mar. 25	Mar. 31				July 30	Aug. 15	
41	North Carolina	35 15	1,700	E.	Black loam	1902	7	Mar. 26	Apr. 2	Apr. 19					
41	do	35 15	1,700	E.	do	1903	8	Mar. 13	Mar. 22						
					GREENSBORO.										
		° ′													
47	South Carolina	34 40	850		Porous clay	1902	4	Mar. 25	Apr. 2	Mar. 21			June 6	June 25	Nov. 27
49	do	34 50	1,000	E.	Cecil clay	1902	10	Mar. 27	Apr. 4	Mar. 20	Mar. 31	Aug. 16	June 10	June 16	Nov. 28
49	do	34 50	1,000	E.	do	1903	11	Mar. 14	Mar. 21	Mar. 10	Mar. 14	Aug. 9	June 15	July 1	Oct. 25
49	do	34 50	1,000	E.	do	1904	12	Mar. 24	Apr. 1	Apr. 26	Mar. 21	July 29	July 1	July 10	Nov. 14
9	Virginia	37 25	1,000	SE.	Red clay	1902	5	Apr. 6	Apr. 15	Apr. 15					
9	do	37 25	1,000	SE.	do	1903	6	Mar. 15	Mar. 26				June 26	July 15	
11	do	37 25	1,400	NW.	Porous loam	1902	5	Apr. 19	Apr. 22	Apr. 8	Apr. 21	July —	July 15	Aug. 15	
14	do	38 30	400	N.	Red clay	1902	3	Apr. 13	Apr. 18	Apr. 15	Apr. 11	Aug. 22	July 17		Oct. 22
14	do	38 30	400	N.	do	1903	4		Mar. 30	Apr. 5		Aug. 12	July 1	July 10	Oct. 18
14	do	38 30	400	N.	do	1904	5	Apr. 20	Apr. 26	Apr. 23	Apr. 10	July 15			Sept. 23
					HEATH CLING.										
		° ′													
40	North Carolina	34 15	10	S.	Sandy loam	1902	4	Mar. 10	Mar. 24	Apr. 3	Apr. 14				Nov. 14
47	South Carolina	34 40	850		Clay loam	1902	12	Mar. 28	Apr. 7	Mar. 21			Aug. 28	Sept. 10	Nov. 27
41	North Carolina	35 15	1,700	E.	Black loam	1902	7	Mar. 26	Mar. 31	Mar. 19	Mar. 2				
31	do	35 35	2,300	S.	Red clay	1902	4	Apr. 8	Apr. 15	Apr. 18	Mar. 20	June 25	Aug. 10	Aug. 20	Oct. 15
31	do	35 35	2,300	S.	do	1904	6	Apr. 3	Apr. 10	Apr. 20					Do.
6	Virginia	37 25	1,000	SE.	Cecil clay	1902	5	Apr. 1	do	Mar. 20	Apr. 1	July 1	Sept. 10	Oct. 1	Oct. 20
6	do	37 25	1,000	SE.	do	1903	6	Apr. 10	Apr. 20	Apr. 20	Apr. 10	do	do	do	Oct. 15
27	do	37 55	200	S.	Sandy loam	1902	15	do	Apr. 18	Apr. 9	Apr. 25		Sept. 25	Oct. 15	Oct. 30
2	do	38 15	900	None.	Cecil clay	1902	10	Apr. 9	Apr. 14	Apr. 3	Apr. 9				Oct. —
26	do	38 45	375	SE.	Loam	1903	10	Mar. 23	Mar. 26	Apr. 5	Apr. 14		Sept. 25	Sept. 28	Oct. 25

LATE CRAWFORD.

		°	′														
59	Georgia	34	30	1,600	None.	Sandy loam	1904	6	Mar. 20	Mar. 28	Apr. 12	Mar. 22	June 20	Aug. 15	Aug. 25		
41	North Carolina	35	15	1,700	E.	Black loam	1902	7	Mar. 26	Apr. 2	Mar. 11	Apr. 3			Sept. 15	Oct. 10	
36	do	35	30	2,850	NW.	Clay loam	1902	5	Mar. 31	Apr. 10	Mar. 25	Apr. 20	July 26	Sept. 3		Oct. 15	
42	do	36	10	3,250	S.	Black loam	1904	2	Apr. 25	Apr. 29	Apr. 21	May 1	Aug. 6			Oct. 17	
12	Virginia	37	0	5	SW.	Sandy loam	1904	8	Apr. 2	Apr. 9	Apr. 20	Apr. 1	Aug. 14			Oct. —	
2	do	38	5	900	None.	Cecil clay	1902	5	Apr. 1	Apr. 7	Apr. 3	do		Sept. 7	Sept. 25		
14	do	38	30	400	N.	Red clay	1902	12	Apr. 15	Apr. 21	Apr. 15	Apr. 14	Aug. 25			Oct. 22	
14	do	38	30	400	N.	do	1903	13		Apr. 1	Apr. 5		Aug. 15			Oct. 18	
14	do	38	30	400	N.	do	1904	14	Apr. 16	Apr. 20	Apr. 23	Mar. 11	July 17			Sept. 23	

MOUNTAIN ROSE.

		°	′														
12	Virginia	37	0	5	SW.	Sandy loam	1903	7	Mar. 22	Mar. 24	Apr. 5	Mar. 24				Oct. 27	
12	do	37	0	5	SW.	do	1904	8	Apr. 4		Apr. 20	Apr. 5	Aug. 12	Aug. 2	Aug. 12	Oct. 17	
5	do	37	25	1,000	N. & W.	Cecil Clay	1903	7	Mar. 21	Mar. 30	Apr. 5	Mar. 28			Aug. 5	Oct. 30	
5	do	37	25	1,000	N. & W.	do	1904	8	Apr. 6	Apr. 16	Apr. 22						
11	do	37	25	1,400	NW.	Porous loam	1902	5	Apr. 16	Apr. 19	Apr. 8	Apr. 21	July —	Aug. 1	Aug. 30		
2	do	38	5	900	None.	Cecil clay	1902	10	Apr. 7	Apr. 12	Apr. 3	Apr. 7				Oct. —	
13	do	38	50	300	E. & W.	Sandy	1902	12	Apr. 10		May 30			Aug. 10	Aug. 25	Sept. 18	

OLDMIXON.

		°	′														
47	South Carolina	34	40	850		Clay loam	1902	9	Mar. 27	Apr. 5	Mar. 21			Aug. 7	Aug. 27	Nov. 27	
36	North Carolina	35	30	2,850	NW.	do	1902	5	Mar. 31	Apr. 7	Mar. 25	Apr. 16	July 30	Sept. 1	Sept. 10	Oct. 10	
36	do	35	30	2,850	NW.	do	1903	6	Mar. 12	Mar. 24	Apr. 28	Mar. 25	July 20			Oct. 15	
5	Virginia	37	25	1,000	N. & W.	Cecil clay	1903	7	Mar. 21	Mar. 30	Apr. 5	Mar. 28				Oct. 30	
5	do	37	25	1,000	N. & W.	do	1904	8	Apr. 6	Apr. 16	Apr. 22						
27	do	37	55	200	S.	Sandy loam	1902	15	Apr. 10	Apr. 18	Apr. 9	Apr. 25		Aug. 1	Sept. 1	Do.	
27	do	37	55	200	S.	do	1903	16	Mar. 24	Apr. 1				Aug. 20	do	Sept. 7	
27	do	37	55	200	S.	do	1904	17	Apr. 15	Apr. 23	Apr. 6	Apr. 20		Aug. 25	Sept. 5		
16	do	38	15	400	NE.	Sandy	1902	5	Apr. 10	Apr. 12	May 3	do				Oct. 17	
17	do	38	15	150	S.	Sandy loam	1902		Mar. 31	do	Mar. 18	Apr. 7					
26	do	38	45	325	S. & E.	Loam	1903	3	Mar. 23	Mar. 28	Apr. 5	Apr. 10		Aug. 5	Aug. 25	Oct. 25	
13	do	38	50	300	E. & W.	Sandy	1902	12	Apr. 13		May 30			Aug. 15	Sept. 10	Sept. 18	
30	do	38	55	800	N. & E.	Porous loam	1902	4	Apr. 15	Apr. 20	Apr. 14	Apr. 18		Aug. 10	Aug. 18		

Phenological records—Peaches—Continued.

RIVERS.

Observer's number.	State.	Approximate latitude.	Elevation (feet).	Slope.	Soil.	Year.	Age of tree (years).	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first picking.	Date last picking.	Date first fall frost.
		° ′													
60	Georgia	31 25	450	E. & W.	Sandy loam	1902	6	Mar. 7	Mar. 16	Mar. 11	Mar. 16	July 28			Nov. 1
62	do	32 5	450	S.	Sandy	1902	6	Mar. 20	Mar. 24	Feb. 27	Apr. 1		June 10	June 20	Nov. 20
62	do	32 5	450	S.	do	1903	7	Mar. 12	Mar. 20	Feb. 17	Apr. 3	May 25	June 20	June 25	Nov. 10
45	South Carolina	33 25	350	E.	do	1903	5	Mar. 10	Mar. 15	Mar. 11		July 1	June 5	June 20	Oct. 24
45	do	33 25	350	E.	do	1904	6	Mar. 11	Mar. 17	Apr. 5		June 20	June 9	June 24	Oct. 16
61	Georgia	34 5	1,540	None.	Clay loam	1902	3	Mar. 24	Mar. 31				June 17	July 1	
47	South Carolina	34 40	850		do	1902	12	Mar. 27	Apr. 4	Mar. 21			June 27	July 9	Nov. 27
49	do	34 50	1,000	E.	Cecil clay	1903	11	Mar. 14	Mar. 21	Mar. 10	Mar. 18	Aug. 9	June 10	June 20	Oct. 25
41	North Carolina	35 15	1,700	E.	Black loam	1902	7	Mar. 27	Apr. 2	Mar. 19	Apr. 1				
41	do	35 15	1,700	E.	do	1903	8	Mar. 19	Mar. 25	Feb. —					
38	do	35 25	2,128	W.	Porous loam	1902	8	Apr. 12	Apr. 20	Apr. 5	Apr. 24	July 8	July 12	July 22	Oct. 15
12	Virginia	37 0	5	SW.	Sandy loam	1903	7	Mar. 23	Mar. 26	do	Apr. 5	Aug. 12	July 14	July 20	Oct. 27
12	do	37 0	5	SW.	do	1904	8	Apr. 5	Apr. 9	Apr. 20					Oct. 17
5	do	37 25	1,000	N. & W.	Cecil clay	1903	3	Mar. 21	Mar. 30	Apr. 5				July 10	Oct. 30
2	do	38 5	900	None.	do	1902	5	Apr. 1	Apr. 7	Apr. 3	Apr. 1				Oct. —
26	do	38 45	325	S. & E.	Loam	1903	8	Mar. 22	Mar. 28	Apr. 5			July 4	July 12	Oct. 25

ST. JOHN.

		° ′													
60	Georgia	31 25	450	E. & W.	Sandy loam	1902	6	Mar. 9	Mar. 20	Mar. 11	Mar. 13	July 25			Nov. 1
49	South Carolina	34 50	1,000	E.	Cecil clay	1903	3	Mar. 16	Mar. 23	Mar. 10	Mar. 16	Aug. 11	July 10	July 23	Oct. 25
49	do	34 50	1,000	E.	do	1904	4	Mar. 18	Mar. 27	Apr. 26	Mar. 17	July 24	July 20	July 30	Nov. 14
41	North Carolina	35 15	1,700	E.	Black loam	1902	7	Mar. 26	Apr. 2	Mar. 19	Apr. 2				
41	do	35 15	1,700	E.	do	1903	8	Mar. 17	Mar. 23	Feb. —					

SALWAY.

		°	′													
61	Georgia	34	5	540	None.	Clay loam	1902	3	Mar. 23	Mar. 29				Aug. 29	Sept. 15	
49	South Carolina	34	50	1,000	E.	Cecil clay	1902	3	Mar. 27	Apr. 6	Mar. 28	Apr. 2	Aug. 17	Sept. 9	Oct. 1	Nov. 28
49	do	34	50	1,000	E.	do	1903	4	Mar. 16	Mar. 23	Mar. 10	May 19	Aug. 9	Sept. 15	Sept. 25	Oct. 25
49	do	34	50	1,000	E.	do	1904	5	Mar. 21	Apr. 1	Apr. 26	Mar. 19	July 28	Sept. 1	Sept. 15	Nov. 14
9	Virginia	37	25	1,100	SE.	Red clay	1902		Apr. 10	Apr. 20	Mar. 15					
5	do	37	25	1,000	N. & W.	Cecil clay	1903	3	Mar. 23	Mar. 30	Apr. 5				Sept. 10	Oct. 30
14	do	38	30	400	N.	Red clay	1902	4	Apr. 12	Apr. 20	Apr. 15	Apr. 14	Aug. 21	Aug. 18	Aug. 26	Oct. 22
14	do	38	30	400	N.	do	1903	5		Apr. 1	Apr. 5		Aug. 15	Aug. 12	Aug. 29	Oct. 18
14	do	38	30	400	N.	do	1904	6	Apr. 16	Apr. 21	Apr. 23	Apr. 10	July 22	Aug. 26	Sept. 14	Sept. 23

SMOCK.

		°	′													
47	South Carolina	34	40	850		Clay loam	1902		Mar. 27	Apr. 3	Mar. 21			Aug. 20	Sept. 10	Nov. 27
32	North Carolina	35	30	2,800	E.	Black loam	1904		Apr. 1	Apr. 9	Apr. 20	Apr. 2	Aug. 12			Nov. 14
12	Virginia	37	0	5	SW.	Sandy loam	1904	8	Apr. 5	Apr. 12	Apr. 20	Apr. 6	Aug. 16			Oct. 17
16	do	38	15	400	NE.	Sandy	1902	7	Apr. 8	Apr. 11	May 3	Apr. 20				Do.
26	do	38	45	325	S. & E.	Loam	1903	10	Mar. 23	Mar. 28	Apr. 5	Apr. 12		Sept. 3	Sept. 10	Oct. 25

STUMP.

		°	′													
44	South Carolina	33	30	500	W. & N.	Sandy	1902	8	Mar. 15	Mar. 20	Mar. 22					
54	Georgia	34	5	700	S.	Cecil clay	1904	8	Mar. 12	do	Apr. 5	Mar. 8	Aug. 15	Aug. 8	Aug. 20	Oct. 22
47	South Carolina	34	40	850		Clay loam	1902	12	Mar. 24	Mar. 30	Mar. 21			July 20	Aug. 5	Nov. 27
32	North Carolina	35	30	2,800	E.	Black loam	1904	8	Apr. 7	Apr. 11	Apr. 20	Apr. 4	Aug. 15	Sept. 10		Oct. 14
31	do	35	35	2,300	S.	Red clay	1902	4	Apr. 11	Apr. 19	Apr. 18	Apr. 21	June 25	Aug. 15	Aug. 28	Oct. 15
31	do	35	35	2,300	S.	do	1904	6	Apr. 3		Apr. 20	Apr. 10				Do.
42	do	36	10	3,250	S.	Black loam	1904	2	Apr. 24	Apr. 28	Apr. 21	May 4	July 25			Do.
27	do	37	55	200	S.	Sandy loam	1902	15	Apr. 10	Apr. 18	Apr. 9	Apr. 25		Aug. 1	Sept. 1	Oct. 30
27	do	37	55	200	S.	do	1903	16	Mar. 24	Apr. 1				Sept. 1	Sept. 20	
27	do	37	55	200	S.	do	1904	17	Apr. 15	Apr. 20	Apr. 6	Apr. 20		Sept. 5	Sept. 25	Sept. 7
16	do	38	15	400	NE.	Sandy	1902	5	Apr. 7	Apr. 10	May 3	Apr. 18				Oct. 17
17	do	38	15	150	S.	Sandy loam	1902		Mar. 31	Apr. 12	Mar. 18	Apr. 7				
26	do	38	45	325	S. & E.	Loam	1903	10	Mar. 26	Mar. 29	Apr. 5	Apr. 10		Aug. 8	Aug. 12	Oct. 25
13	Virginia	38	50	300	E. & W.	Sandy	1902	13	Apr. 10		May 30			Aug. 20	Sept. 10	Sept. 18
30	do	38	55	800	N. & E.	Porous loam	1902	4	Apr. 12	Apr. 18	Apr. 14	Apr. 17		Aug. 10	Aug. 18	

DESCRIPTION OF PLATES.

PLATE I. *Frontispiece.*—A typical mountain apple orchard located on the northeast slope of Sharp Peak (Peaks of Otter), Virginia. This orchard contains many Yellow Newtown trees. Elevation, about 2,300 feet; soil, Porters black loam.

PLATE II. Fig. 1.—Country characteristic of the Piedmont region, Virginia, showing the rolling character of the land. Young apple orchard at the right, Peaks of Otter at the left. Elevation, 1,000 feet; soil, Cecil clay. Fig. 2.—A young interplanted peach and apple orchard, Amherst County, Va., in the Piedmont region. Located at the base and on the lower slopes of a spur of the Blue Ridge.

PLATE III. Fig. 1.—A detached knob of the Blue Ridge on which are located profitable orchards of Yellow Newtown apples and Bilyeu peaches. A desirable location for these varieties. Fig. 2.—Lower portion of a "cove" orchard, Albemarle County, Va., looking down the cove.

PLATE IV.—Relief map showing a portion of the Piedmont region adjacent to the Blue Ridge, the Blue Ridge region south of a point in that region in proximity to Charlottesville, Va., and other contiguous areas not included in the present paper. (Original modeled by E. E. Howell and negative of same loaned by him to this Department.)

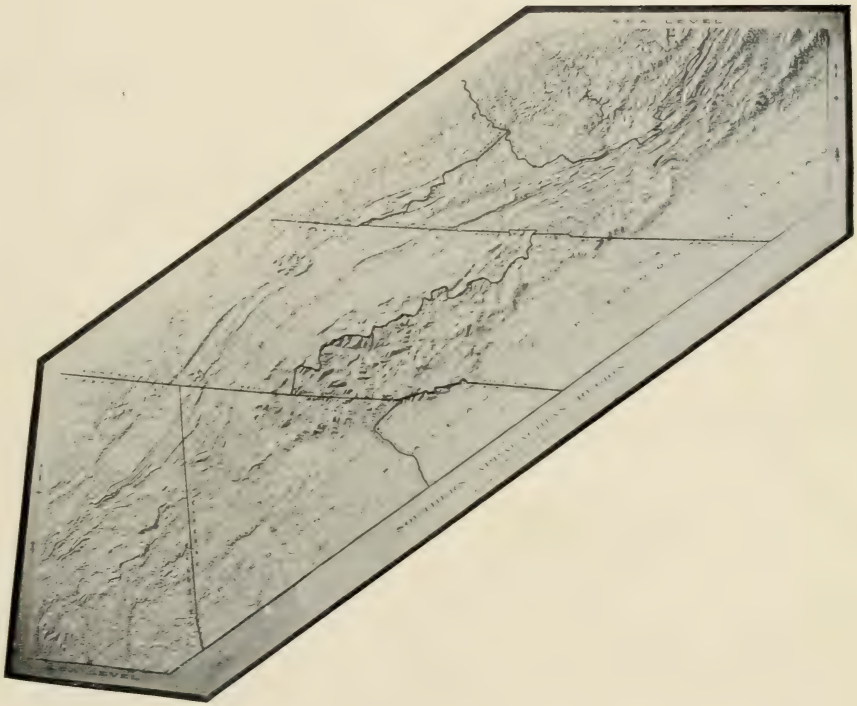
PLATE V.—Map showing the pomological regions of Virginia and the South Atlantic States. Section of map indicated by lighter horizontal hatching represents elevation from sea level to 500 feet; mostly Coastal Plain. Section indicated by heavier diagonal hatching represents elevations from about 500 feet to 1,500 feet, except in Virginia north of the Roanoke River, where the extreme elevation is 1,000 feet; nearly all Piedmont region. Vertical hatching represents elevations from 1,500 feet, except in Virginia as noted above, to 4,000 feet; Blue Ridge region. Lighter diagonal hatching represents elevations from about 1,500 feet to 4,000 feet; Allegheny and Cumberland plateaus. Solid green areas, elevations exceeding 4,000 feet. Heavier horizontal hatching, elevations from about 500 to 1,500 feet; valley regions. (Base map, section from contour map, by United States Geological Survey.)

FIG. 1.—COUNTRY CHARACTERISTIC OF THE PIEDMONT REGION, VIRGINIA. THE PEAKS OF OTTER IN THE BACKGROUND.

FIG. 2.—A YOUNG INTERPLANTED PEACH AND APPLE ORCHARD AT THE BASE OF TOBACCO ROW MOUNTAIN, AMHERST COUNTY, VA., IN THE PIEDMONT REGION.

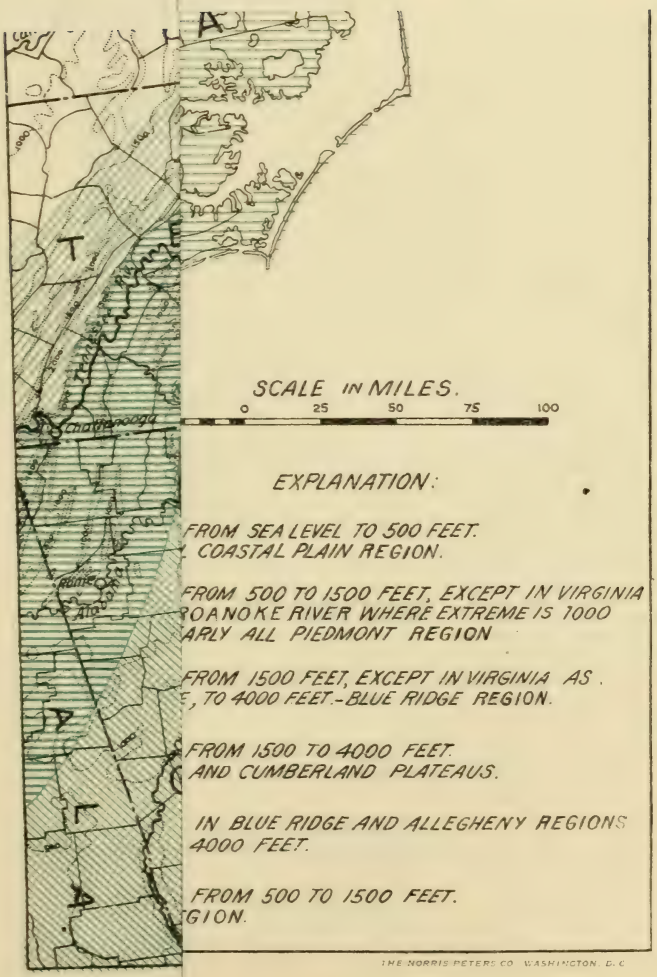
FIG. 1.—A DETACHED KNOB OF THE BLUE RIDGE IN VIRGINIA, SHOWING A CHARACTERISTIC ORCHARD LOCATION.

FIG. 2.—LOWER PORTION OF A COVE ORCHARD, ALBEMARLE COUNTY, VA.



RELIEF MAP SHOWING A PORTION OF THE PIEDMONT AND BLUE RIDGE REGIONS OF THE SOUTH ATLANTIC STATES.

[Photographed from a model by Howell.]



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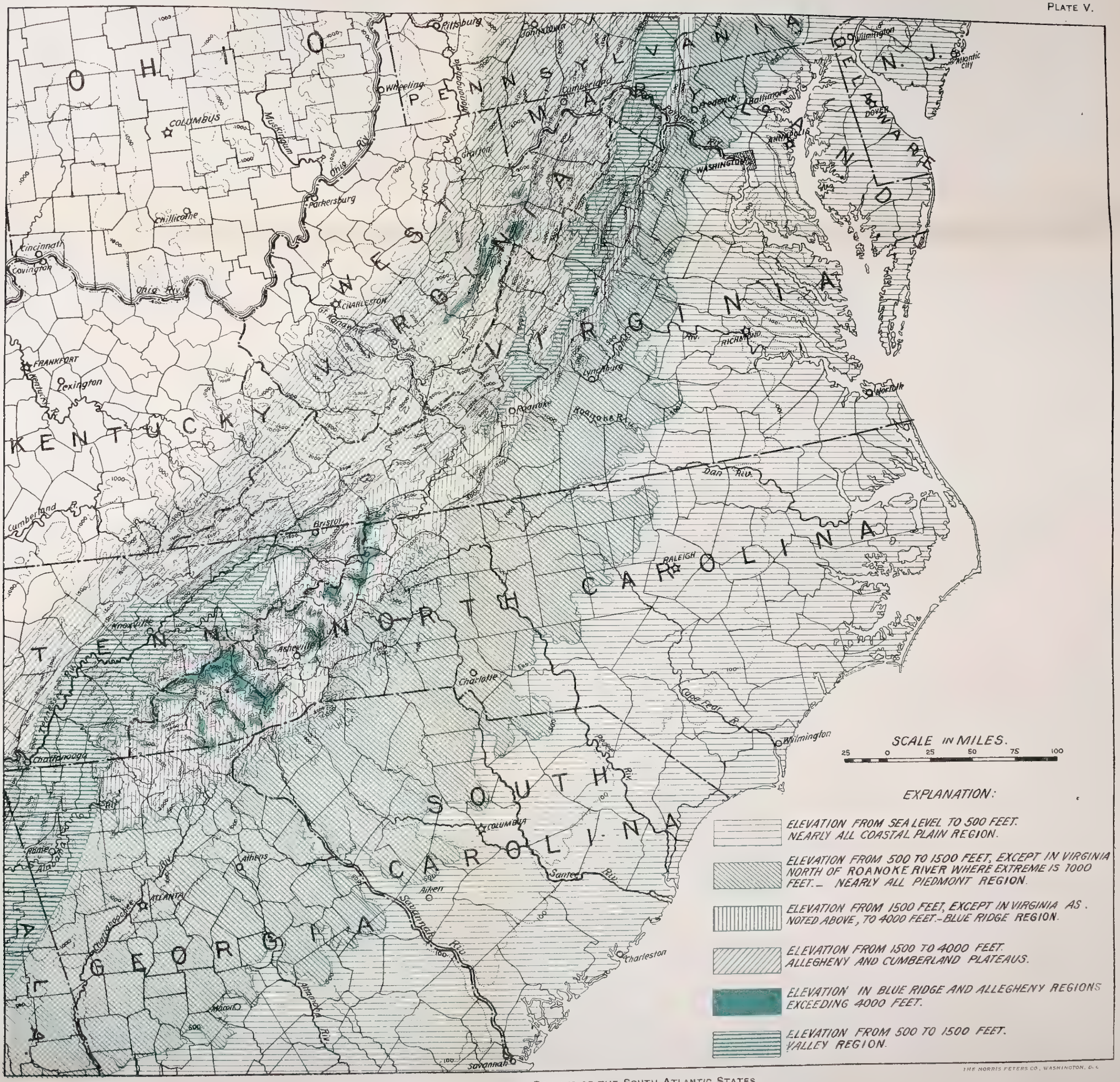

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MAP SHOWING POMOLOGICAL REGIONS OF THE SOUTH ATLANTIC STATES.

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[In the case of synonyms the names are distinguished from the leading varietal names by the use of italic type.]

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